

COAL AGE

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Undoubtedly one of the most overworked phrases in the English language to-day, is the one that reminds us of the "survival of the fittest." Please observe that we do not insinuate that the fittest do not survive; we simply wished to call attention to the fact that everybody seems to be telling everyone else that the fittest do survive.

Yes, the fittest do survive, but there are times and circumstances, when the fittest have survived, very much to their own sorrow.

A few weeks ago we had occasion to pay a visit to a vanishing mining town, which is even now a town, only by right of past remembrances.

Many years ago, it boasted the most prosperous mining community in the state, and it was not all boast, either. We, the scribe, happened to be the camp's mining engineer at that time, so we sort of know whereof we speak. But now—mostly a roosting place for bats—every house in the camp, save one, is deserted and tottering.

The one exception is occupied by the caretaker of the property. Lower seams that may be available some day make it desirable to keep the property intact, and so, to guard against squatters, the caretaker and his wife are retained. We found them working in their garden just back of their home; an old, weary couple, very much in harmony with all their surroundings.

Imagine our surprise when the old man fell on our neck, weeping, calling us by name.

Yes, it was Tobin (we will call him Tobin), the master mechanic of the camp in the good old days, now left high and dry, forgetting and forgotten.

Here's the story:

He was a good master mechanic, proud of his camp, and of his job; too proud in fact, which explains the tragedy. He became suspicious of his men, fearing constantly that they were trying to undermine him, scheming for his job. He changed men constantly, planning thus to outwit them.

He builded better than he knew. He succeeded so well that no one was ever able to displace him. But years slip by quickly and, while Tobin was so busy holding onto his job and watching the other fellows who appeared envious, he failed to realize that the camp's usefulness was rapidly coming to an end, and, naturally, he got out of touch with progress in his profession.

When the end came Tobin had still survived and there he remains to this day.

Thomas Moore moved the world to tears with "The Last Rose of Summer."

That's because his rose was symbolic of so many Tobins.

Reinforced Concrete as Adapted to Mine Timbering

BY N. H. ROWLAND*

SYNOPSIS—Wood is unsuitable for mine timbering where permanency and non-combustibility are requisites. Under such circumstances, reinforced concrete appears to possess many advantages over steel, chief among which is its lesser cost.

The chief advantages of timber for underground mining operations have been its wide distribution with ease of access to place of use, its consequent cheapness, and the simplicity with which it can be framed and fitted to service.

With modern improvements in mining methods and the application of wider intelligence in the use of men and materials to promote the greatest efficiency in operation, and therewith the largest returns on capital investment from the minimum ultimate expenditure in construction and maintenance, there has come a keener appreciation of the fact that timber is not universally adapted to all the construction incident to mining operations, and that in many situations its use may be attended with large economic waste.

The laws of true efficiency in mining operations call for the prevention of waste both economic and human, and therefore demand for mine timbering economy of material, space and time; of material in order that each piece may do work up to its full capacity; of space for the prevention of useless and profitless excavation; of time needlessly spent in repairs and renewals on materials not truly adapted for mine timbering purposes. Some of the economic wastes involved in the use of wooden timbers for underground mining operations under conditions of loading or temperature wherein they cannot be expected to endure for more than a limited period of time are as follows:

1. Waste in sizes: The compressive strength of wood is much greater than its transverse strength, and under ordinary conditions there is absolutely no technical reason why the legs of the timber square set should be made the same size of the collar; the extra amount of material that goes into the legs is wasted, and means direct extra expense in the way of freight and handling.

2. Waste in framing and decay: The material cut away and lost in framing involves considerable waste, sometimes a part of the piece is injured, and the entire member rendered useless. Waste also occurs in the use of timbers under temperature conditions where decay and destruction by insect action are a matter of relatively short time. Ten per cent. of all the mine timber, according to the U. S. Dept. of Agriculture, is destroyed by insect action and 45% by decay. The enormous quantities of timber consumed in the mines and the necessity for the replacement of the entire equipment inside the workings of an anthracite mine in 12 to 18 months emphasize the unsuitability of wood for this purpose, and the economic waste involved by its use.

3. Waste by fire: Waste also occurs from the exposure of timber to situations where fires may be ex-

pected. The long line of disastrous mine fires calls attention to this ever present danger in coal mining operations, the necessity of continual vigilance for its prevention, and the importance of the use at recognized points of danger, of materials of construction that are fitted to reduce, if not to entirely avoid, the economic waste due to the use of wooden timbers in locations for which they are not in all respects adapted.

4. Waste from lack of re-use: Waste also occurs owing to the failure to draw or re-use the timbers of completed rooms, abandoned headings, etc. Under present conditions in this country, wooden props and gangway supports are seldom withdrawn and are usually utterly worthless when the time comes for their replace-

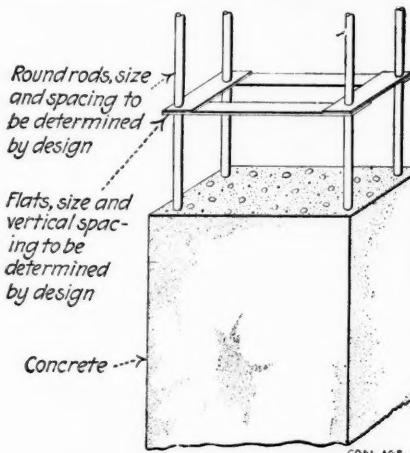


FIG. 1. A PROP DESIGNED LIKE A BUILDING COLUMN

ment. They form an excellent place for the origination of fires or their maintenance when once started. In England and on the Continent it is the custom to withdraw and re-use all the timber, and the prevention of waste by the use of material for props and gangway supports which is capable of repeated re-use has been thoroughly justified by ultimate economy in expenditure.

SUBSTITUTES FOR WOOD

The rapid exhaustion of suitable timber for use in underground operations and the desirability of some substitute readily adapted to the requirements of mining, and economical in the total cost of production, which would eliminate the above mentioned wastes has led to the consideration of substitutes for timber. Every consideration which may be adduced for fire-proof construction above ground avails with even greater force for the elimination of inflammable materials, so far as possible, from underground structures. Fireproof buildings underground mean safety, and therewith reduction of expense in maintenance and replacement. Steel or reinforced concrete structures mean mine insurance.

The superiority of reinforced concrete to wood is due to the fact that it possesses all the latter's well known advantages with none of its disadvantages. The substitution of this material of greater strength and endur-

ance for a similar one of less tenacity avoids, moreover, all those elements of economic waste to which timber is liable, entailing meanwhile less excavation, better ventilation, and greater permanency.

Wooden shapes which have proven themselves suitable for mine-timbering purposes can be exactly duplicated in reinforced concrete. A set of reinforced concrete gangway supports may alternate with wooden timbers; wood may be taken out and reinforced concrete put in its place, and vice versa.

Some highly successful applications of concrete construction, reinforced and plain, have already been made in mining operations. The advantages secured are non-inflammability, the possibility of obtaining a large portion of the ingredients in close proximity to the mines themselves and the readiness with which concrete can be prepared to sustain either light or heavy stresses.

If there were no other reasons for the use of reinforced concrete in mines, the preservation of the vital parts of the operations from fire loss merits the most careful consideration, while another great advantage lies in its great strength and stiffness. In many cases its use in underground operations in mine timbering means decreased cost of production and therewith increased returns on capital investment. The theoretical conditions which prove this statement are just those which account for its extended use in the construction of bridges, buildings, etc., and which make truly economical its use in the building of mine structures above ground.

Many modern mines are using steel for supporting gangways, and satisfaction has attended these examples. Even where loads are not great and the fire hazard low, the use of metal in place of wood has been found a profitable investment on the basis of the ultimate economy in the expenditure, which results from low maintenance charges and infrequent renewals.

STEEL MINE TIMBERS IN OHIO

Extensive installations of this character are found in the 8th and 9th mining districts of Ohio; for instance, in the mines of the Roby Coal Co., at Adena. In the 35th Annual Report of the Chief Inspector of Mines of Ohio, page 430, it is stated:

The mines have a very tender roof and at one time the haulways were considered the most dangerous in the district. . . . The main entry is now timbered with steel I-beams. . . . The management informs me that the cost of production is a great deal less than when they attempted to operate without properly timbering the haulways.

At Barton during 1909, the mines of the Youghiohengy and Ohio Coal Co. were likewise being timbered with steel I-beams in place of wood, eliminating the chance of accidents from falls of roof along the haulways, and the inspectors report that conditions have been thereby decidedly improved.

In the anthracite coal mining region there are to be found long stretches of steel-timbered gangways in the mines of the leading companies, particularly those of the Susquehanna Coal Co., and its subsidiaries, the Lehigh Valley Coal Co., etc.

Inasmuch as steel, however, is considerably more expensive than reinforced concrete, and as the latter possesses all the advantages of the former, it would appear that reinforced concrete would be well adapted to gangway timbering. Of course, it might be contended that on account of its low tensile strength and relatively high re-

sistance to compression and crushing, that concrete would not be as suitable as steel, which has a high tensile strength, and is therefore fitted to carry large loads over wide spans with a minimum ratio of dead weight to external loading.

In most mines, however, the gangways are so driven that it is unnecessary to cover wide spans. If it were found necessary to meet such conditions, a more complicated system might have to be considered, and a few props could be so placed as to reduce the span while leaving the passages as unobstructed as possible.

It might also be claimed that concrete preparation calls for the employment of skilled labor, and that entirely satisfactory principles of design have not yet been finally determined.

Reinforced-concrete collars and props, however, in my opinion, can replace wooden construction fully and

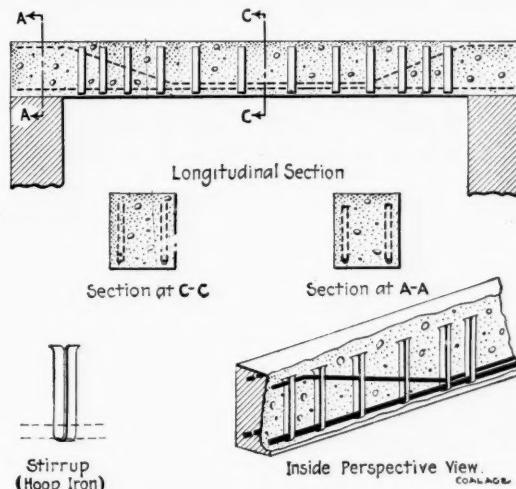


FIG. 2. COLLARS ARE REINFORCED LIKE BEAMS IN BUILDING CONSTRUCTION

satisfactorily, and with a systematic handling of the problem, at a considerably decreased cost from that of steel timbers. The extra amount of space necessary for erection over that required for steel is so small as to merit little consideration, since the excavation in roof, floor or side of the gangway would be little, if any greater.

Proper design for reinforced concrete used in mine timbering should be based on correct principles of engineering. Props could be planned according to the principles of columns used in the erection of buildings, as shown in Fig. 1, consisting of rods embedded in the concrete near the periphery. These are connected by means of ties, or flats, hoop iron or wire. Thus the radius of gyration is increased and the rods take care of the tensile stresses which occur from eccentric loading or from deflection of columns. The horizontal ties prevent the buckling of the rods and increase the strength of the concrete. They form a hooped column.

LOCAL CONDITIONS DETERMINE SIZE OF MEMBERS

The size and dimensions of these props or columns must be determined by the nature of the roof of the mine they have to support and on the height of the slope or entry wherein they will be used. Above ground it is possible to calculate the loading and the stresses involved with mathematical correctness, but underground there seem to be no well defined rules by which for example the

strength of square timber sets or props may be calculated.

Experience governs the use of wooden mine timbers in such conditions, and it is an easy matter for the engineer to design reinforced-concrete columns or props of equivalent strength so that there may be absolutely no waste of material. Where the strata is horizontal or approximately so, the loads are applied normal to the collar of the gangway support with a practically uniform distribution and produce therein bending moments with compressive stresses in the legs. The minimum amount of material is employed when the collar is exactly proportioned to the bending stresses encountered and each leg to the half load of the collar. Where the dip of the strata is great or where the ground is swelling, legs and collars may be called upon to take both bending and compressive stresses at the same time, and allowance must be made in the design for this joint action.

Regarding the construction of these reinforced-concrete members, inasmuch as suitable sand and gravel can be found in almost any locality, it would only be necessary to ship to the mine the steel and cement. The props and collars could be made in the quantities desired on the surface in close proximity to the mine.

The method of procedure followed would be along the

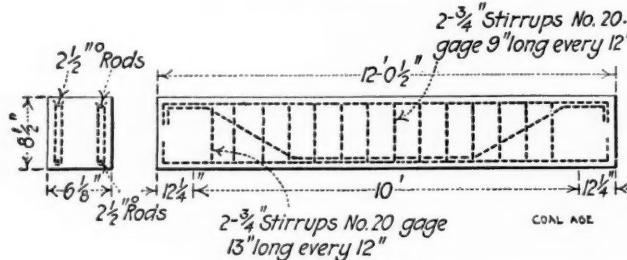


FIG. 3. DESIGN OF A BEAM TESTED TO DESTRUCTION

lines of that pursued in the manufacture of concrete telegraph poles, and the form work would be similar in construction. The lumber used for forms should be of either 1-, 1 1/2- or 2-in. boards, securely braced by 3x3- or 4x4-in. braces, and bolted in order to prevent bulging. The greatest economy is secured by constructing the forms so that they can be used over and over again. Economy can also be gained by fastening form work together with the minimum amount of nailing.

After a number of props have been poured, they should be left to thoroughly set before removal from the forms, after which they may be transported to the desired location in the mine.

As shown in Fig. 2, the collars might be formed, similar to beams in building construction, the concrete being relied upon to resist the compressive stresses in the upper part of the beam, while the steel rods resist tension in the lower portion. These rods, however, should be of two kinds—straight and bent. The bent rods, besides taking their proportions of the direct tension and of the shear, receive any tensile stresses in the upper portion due to a negative moment over the support.

THE TEST OF A BEAM

Regarding the strength of these collars or beams, and the small quantity of steel employed in their construction, Fig. 3 shows the design of a beam made in the open air and not wetted after pouring. The forms were removed just before the tests were made at the end of 60

days. The beam remained in the open air during that time and was not moved until tested.

The following is a result of this test: Length of beam over-all 12 ft. 1/2 in., clear space 10 ft., breadth 6 1/8 in., depth over-all 8 1/2 in., depth to center of steel 7 1/2 in., weight of beam 614 lb., mixture 1:2:4, compression strength, 60 days, 1747 lb. per sq.in.

	Area of steel in tension.....	1.60% of cross-section of beam
	Area of steel in compression..	0.80% of cross-section of beam
Total Load, Deflection,	2.40% of cross-section of beam	
Lb.	In.	Remarks
1350	1/2	
2350	1/8	
3350	1/3	
4350	8/2	
5350	8/8	
6350	1/2	Faint hair cracks on either side of center, very faint
7350	19/2	
8350	13/2	
8650	1	Failure by concrete buckling, at top in center

The relative proportions of strength of reinforced concrete, steel and timber are based on the ordinary method of calculation, as shown in Figs. 4, 5 and 6, and the use of their equivalents produces much stronger and stiffer mine sets than the comparison would seem to indicate. Stiffness is as important as strength, and the spacing should be such as to compel the different sets to act together as a unit under any sudden stress or shock. Light designs with close spacing will therefore be preferable to heavy ones with wide spacing, the roof itself serving as a beam to distribute the load over two or more sets, whereas on wide spacing there is more danger of the roof falling in between the sets. The closer spacing also permits of much lighter lagging.

The prevention of economic losses in reinforced concrete requires the avoidance of waste in fabrication and simplicity in framing. The three-piece wooden timber set is simplicity itself; all that is necessary in erection is to cut the material to length, hew out notches in the collar, and put the three pieces in place. The reinforced concrete sets may also possess the same simplicity which enters largely into the cost of the structure.

The simplicity in construction is shown in the fact that the framing material may be bought at the mill, and the fabrication done by the company's own workmen on the ground. Conditions met with in mining operations may, however, require different arrangements, and the design must be made to suit the circumstances.

THE COSTS VARY WIDELY

Regarding the costs: Conditions in the mine as to sizes of timbers used, the nearness to a supply and the cost of lumber vary widely, and an infinite number of comparisons as to the relative costs of reinforced concrete, steel and wood could be instituted, results of which might not be of exact value. Under the present market conditions, the cost of steel in Pennsylvania is nearly three times the cost of wood used in the square timber sets, and the cost of reinforced concrete may be taken at about one and one-third times the cost of wood. In the first cost of the installation, therefore the advantage will lie with wood.

Where, however, a gangway has to be maintained over a number of years and the workings are in any way permanent, consideration should be given to the capitalized value of the material as compared with the first cost of the installation; and reinforced concrete will be found economical in most cases on the basis of ultimate cost by reason of its long life and endurance.

Taking as a basis of estimate the present price of structural steel at \$1.405 per 100 lb. f.o.b. cars Pittsburgh, with the usual extras for workmanship, etc., a comparison of the relative costs of the form of gangway supports shown in Figs. 4, 5 and 6, is as follows:

The cost of the timber sets, as shown in Fig. 4, was \$7.50, erected. The cost of the steel sets, as shown in Fig. 6, would be \$22, erected. If painted, the cost would be about \$2 per ton additional. The cost of the reinforced-concrete set would be \$10, erected.

Reckoning 6 per cent. compound interest, on the low assumption of 15 years life, the steel set at the end of

and the blowing down of a few sets by explosive action cannot occasion the caving in, and the heavy expense which comes as a result of the burning out of wooden timbers. Another item in favor of reinforced concrete is the possibility of its re-use. It can be taken out and reused many times, and its durability and economy due to its long life are large factors in the prevention of economic waste.

The assumptions above made in discussing relative costs of mine timber sets are believed to be extremely conservative, for the reason, first that steel mine timbers exposed to temperatures and moisture conditions exist-

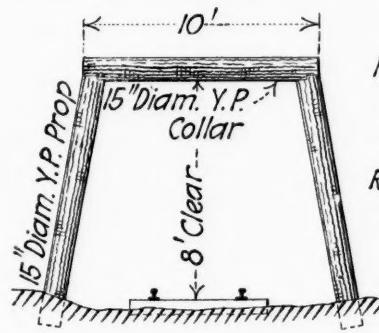


FIG. 4

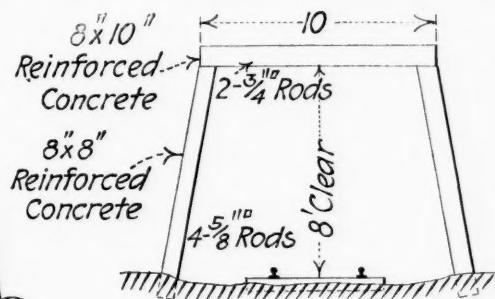


FIG. 5

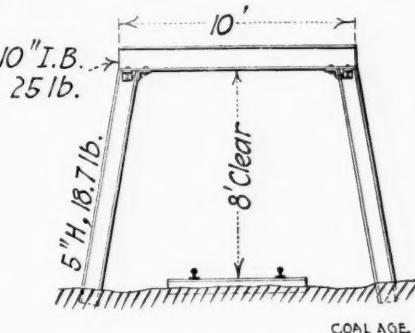


FIG. 6

COMPARATIVE SIZE OF WOOD, STEEL AND REINFORCED-CONCRETE TIMBER SETS

this period will represent an investment of \$52.72, and the reinforced concrete set \$23.97. During the same length of time, based on past experience and on the present cost of timber, six wooden sets would be required at a capitalized value of about \$100.

On this basis, the saving on the steel timbers can be set down as \$47.28 per set, which means a saving per year of \$3.15; on the reinforced concrete, the saving per set is \$76.03, which amounts to a yearly saving of \$5.07 over lumber, and over steel of \$1.92 per year per set.

A reinforced-concrete design is shown in Fig. 7, and the above cost is figured as follows:

Steel rods, including stirrups, labor and material....	\$2.25
Aggregates, sand, cement and stone, hauling, mixing concrete and placing, including foreman's wages....	3.28
*Forms, carpenter work, labor and material (assume forms used three times, equals one-third of \$6.25, equals)	2.25
	<hr/>
Transporting to mine and erecting (30% of \$7.78)....	\$7.78
	<hr/>
Total	2.22
*This item includes removal and resetting of forms.	
	<hr/>
	\$10.00

This item includes removal and resetting of forms.

Regarding the handling, the following is a comparison of the weights per set: Timber 2200 lb., steel 650 lb., reinforced concrete 1800 lb. From these figures it will be seen that the advantage as regards weight lies with steel, but this handling would only figure in the cost of transportation from the surface in proximity to the drift, slope, or shaft mouth to the destination in the mine, and would not in any way, enter into freight charges, the transportation costs on the plain concrete material being considerably less than on the steel set. It will also be seen that concrete compares favorably in weight with lumber.

Noncombustible material has already demonstrated its usefulness in mines where explosions and fires have occurred. Reinforced concrete cannot support combustion,

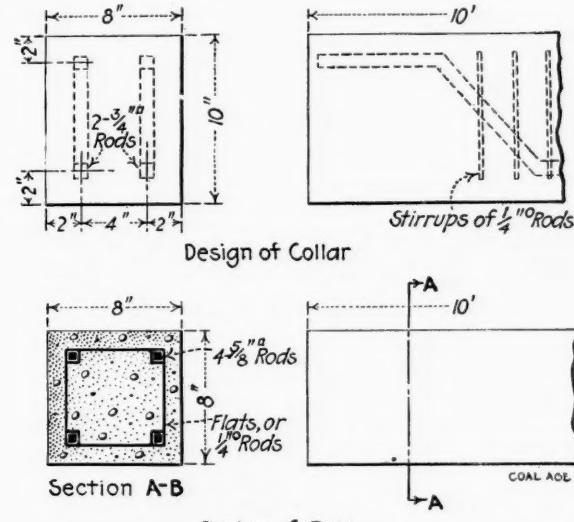


FIG. 7. DESIGN FOR A REINFORCED-CONCRETE TIMBER SET

ing in mines have been in use in this country without deterioration since 1897; and second, because English and Continental practice has given us records extending over a much longer period of time. The average life of steel props in Warwickshire, England, for instance, varies from 10 to 13 years as compared with three months for timber.

It may be reasonably assumed therefore, that reinforced-concrete sets will last as long as required in any one mine, however large the property and however long it is necessary to maintain the gangway or shaft. Furthermore, in three-piece gangway supports, as indicated in Fig. 5, complete fireproof protection is obtained.

Wildcat Financing in the Penn. Anthracite Regions

BY A. T. SHURICK

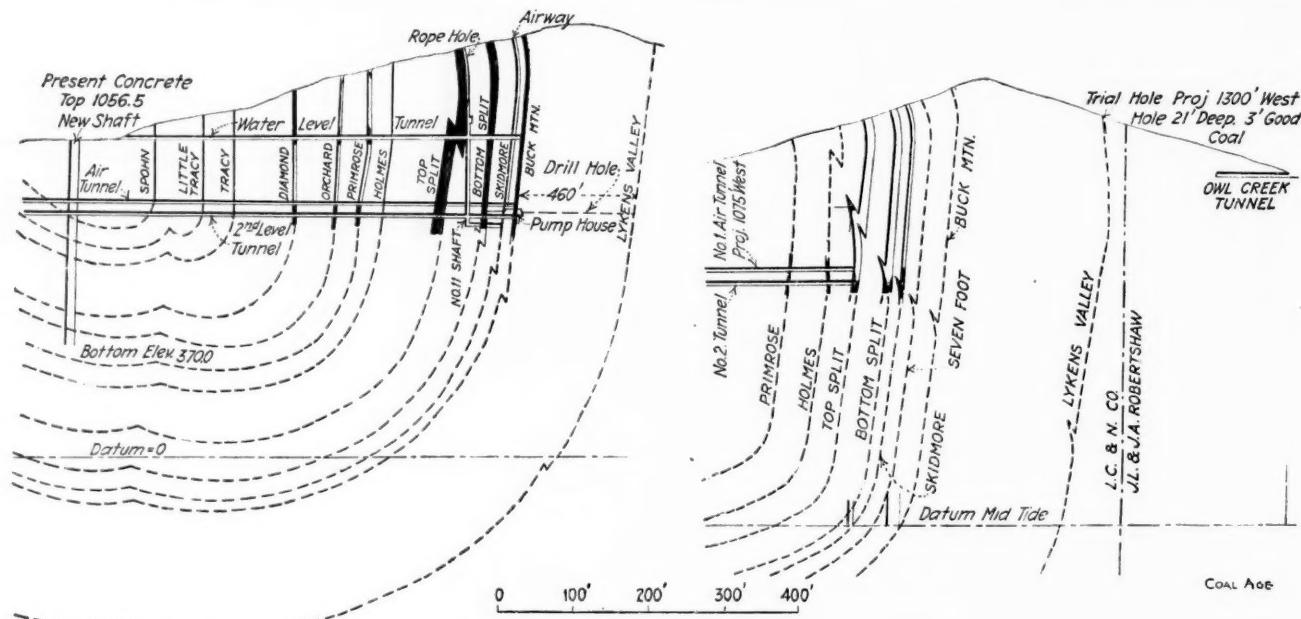
SYNOPSIS—Description of what appears to be a record-breaking coup in fraudulent mining enterprises. The scheme was greatly facilitated by the complicated geology, characteristic of the Pennsylvania anthracite fields, but had the investors taken the trouble to consult local engineers they would have been promptly informed as to the true status of the situation.

When Sheriff Heartney, of Carbon County, Pennsylvania, attached the property of the Bloomingdale Valley Coal Co., on May 13, the curtain was rung up on the last act of the largest coal-mining swindle in the history of the United States. The scene of the play was not inappropriately laid on the very rim of one of the richest anthracite-bearing sections in the country and the cast in-

Co., together with the prestige and high financial standing of the latter concern, it is believed that practically the whole of both these bond issues were successfully placed.

Although it was generally known in the local mining circles that the properties in question were almost, if not completely, barren of coal, the unusual geology of the district was peculiarly advantageous to the purposes of the promoters. It is, therefore, not so surprising that presumably conservative investors were inveigled into the proposition.

For an obviously fraudulent enterprise, the anthracite industry has never before been the scene of one of such magnitude, and it is probably the largest in the history of the coal industry of this country. The previous most important operation of this kind in the hard-coal regions



SECTIONS OF THE COAL MEASURES AT AND ADJACENT TO THE OPERATIONS OF THE BLOOMINGDALE CO.

cludes one Ernest Fink, fluent and persuasive promoter and gullible investors, mostly from remote sections of the West.

THE PROMOTION

It seems that Fink and his associates from New York acquired control of certain supposedly coal-bearing property contiguous to the operations of the Lehigh Coal & Navigation Co. in the Panther Creek Valley. Apparently two companies were formed to develop the properties, the funds to be acquired by bond issues. The first of these concerns, the Bloomingdale Valley Coal Co., put out an issue of two million dollars, the Elizabeth Trust Co. of New Jersey acting as trustee under the mortgage. The second section of the bond issue was made by the Eastern Pennsylvania Coal Co., of New York, with the Union Trust Co., also of New York, as the trustee under the mortgage. By trading upon the close proximity of their property to that of the Lehigh Coal & Navigation

was that of the Black Diamond Co., which involved one million dollars. This concern acquired a small odd acreage lying between the Reading Co. on one side and the Lehigh Valley on the other. Announcing its intention of leasing the adjoining portions of land, sinking operations were started and a comparatively elaborate breaker constructed. Perhaps the most remarkable feature of this fiasco was its unusual longevity, operations being conducted more or less persistently for some five years. Little coal was found, and this, in addition to the limited acreage, brought the inevitable financial crash, and the entire holdings of the company were ultimately taken over by the Reading Co. for about \$30,000.

THE INVERTED DIP

The Bloomingdale Valley Coal Co. acquired approximately one thousand acres of land, lying about two miles southwest of Lansford, in the vicinity of the Lehigh Coal

& Navigation Co.'s tunnel No. 11.* The two detailed sections in the accompanying figures show the geology of the district in this immediate vicinity. As will be observed, the geology is rather unusual in that the measures have been turned completely past the vertical, in such a manner that the outcrop is an inverted dip. To the casual observer, not familiar with the idiosyncrasies of the anthracite measures, there would be absolutely nothing to indicate that the coal outcropped on a reverse dip.

Apparently the promoters of the enterprise seized upon this condition to establish the claim that the seam dipped directly into their property. There is little or no excuse for a competent engineer to have been misled by these assertions. Even were his field observations of too cursory a nature to determine the real conditions, there are sufficient published data on this district to have at least made him suspicious of the true situation. In fact, had the investors consulted any of the local engineers, they would have been informed of the true condition of affairs.

About the only actual development work done by the Bloomingdale company was the driving of the 240-ft. tunnel crosscutting the measures, apparently with the intention of tapping the Lykens Valley vein. A cross-section of the measures taken on the center line of this tunnel is shown in the accompanying illustration on the right. The exact location of the Lykens Valley vein at this point is more or less a matter of conjecture, but, according to other well established sections in this immediate vicinity, it certainly cannot vary materially from the location here shown.

BLOOMINGDALE PROPERTY BARREN

It will be observed in this section that it is highly

doubtful if the Lykens Valley seam crosses the line into the Bloomingdale Co.'s property at all, and even though it should, it certainly will not be there in sufficient quantity to justify developing. It should also be remembered that the Lykens Valley marks the very bottom of the coal-bearing measures in this vicinity, which forms the conclusive proof that the Bloomingdale company's property is practically barren of coal. In fact, it might be remarked in general that no coal deposits of commercial importance have ever been found to the south of the Sharp Mountains, which form the crown of the sections in the accompanying drawings.

The section on the left is taken through the No. 11 Tunnel of the Lehigh Coal & Navigation Co., and is based on actual developments and surveys. It may, therefore, be assumed as a true exhibition of existing conditions. The section lies 1400 ft. to the east of the other shown at the right, and is at least typical of the conditions in this latter section.

While the No. 11 Tunnel was not driven out to the Lykens Valley vein itself, a horizontal drill hole was driven through to test the coal. This showed only 2 ft. 6 in. of coal, 6 in. of which was coal and slate, and the 2 ft. bone and slate. The shaft shown in the section also cut the Lykens Valley vein, which showed a thickness of only 3 ft., 1 ft. 6 in. of which was shelly, dirty coal, such as would produce rice and barley only, and the balance of 1 ft. 6 in. was a fair coal only.

It is thus evident from these last sections that even had the Bloomingdale company sufficient of the Lykens Valley vein to justify operations, the grade of the coal was such that it could not have been commercially mined in any event.

Notes on Surveying Methods in the Anthracite Regions

BY THOMAS QUINN†

SYNOPSIS—A brief sketch of the engineering methods of the Lehigh Valley Coal Co. Anthracite surveying methods vary considerably from those of the bituminous engineers and the suggestions offered herewith will be of interest to the soft-coal men.

As the methods used in the mining of anthracite coal differ from those in bituminous, so also do the methods used in surveying differ in the respective fields. Practices common in one field could not be used in the other.

sibility. As local conditions govern the methods of mining, so also do they govern the system of surveying. The methods described herewith are those used by the Lehigh Valley Coal Co.

All survey work is, of course, based on the true meridian and the continuous vernier system of azimuth readings is used, south being taken as $0^\circ 00'$, west, north and east 90° , 180° and 270° respectively.

FIELD OPERATIONS

Stations are numbered continuously, each new station

SURVEY OF EAST MAMMOTH GANGWAY

Ref. Vol. 77 Page 10	Sta.	Azimuth	Bearing	Distance		Horz. Dist.	Vertical Height	Elev.	East	West	Total		North	South	Total	North	South	Re- marks
				Meas.	Horz.						East	West	East	West	East	West	East	West
	101	179°51'	N0°00'W	0°09'	79.07	79.07	+0.21	613.72			312.72	(Page 2)			176.31	(Page 2)		
	102	179°51'	N0°00'W	0°09'	79.07	79.07	+0.21	613.93	0.21		312.93	79.07			97.24			
	103	172°07'	N7°53'W	0°12'	210.72	210.72	+1.74	615.67		28.90	341.83	208.73			111.49			
	104	169°10'	N10°50'W	0°54'	49.76	49.76	+0.78	616.45		9.35	351.18	48.87			160.36			
	105	178°53'	N1°07'W	0°32'	216.23	216.23	+0.38	616.83		4.22	355.40	216.19			376.55			
	106	180°54'	N0°54'E	0°20'	111.28	111.28	+0.65	617.48			353.65	111.27			487.82			
	107	181°01'	N1°01'E	0°21'	143.15	143.15	+0.87	618.35			351.11	143.13			630.95			
	Pt.	182°00'		0°25'	56.00	56.00	+0.41	618.76										

Where the veins are horizontal, entries and rooms should and are in most places driven on line while at other times where the coal occurs in pitching veins this is an impos-

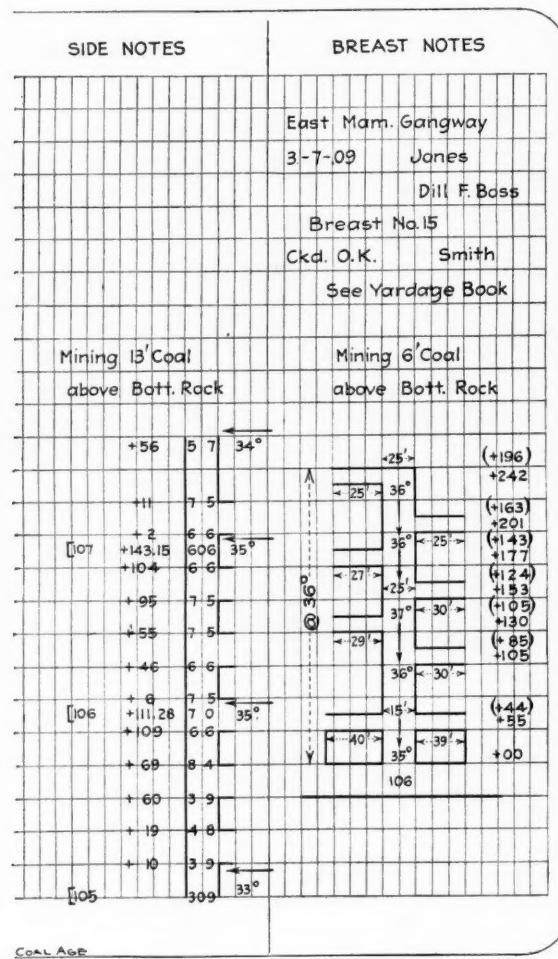
*For a detailed map of this district, see "Coal Age," Vol. 3, p. 724.
†406 W. Poplar St., Harrisburg, Ill.

receiving the next higher number, regardless of its position in the mine. A small circle is painted around the spad and the station number is painted in a conspicuous place near-by, white lead being used for this purpose. All stations are carried in the roof except on rare oc-

casions when conditions will not permit. A 300-ft. steel tape, graduated to every foot, is used, tenths and hundredths being obtained by the aid of a pocket tape.

In beginning a survey the azimuth of the stations started from is always checked by setting up at the next to last station. Should a different azimuth be found than recorded, the survey is followed back until stations are found whose azimuth corresponds with the notes. As a great many stations are set in timbers, it is not uncommon to find some that have been moved by the gradual settling of the roof.

The vertical angle is read on every sight and the elevation of the sight, above or below the height of instrument, is noted. The compass is read frequently as a check on the azimuth and all gangways and every fifth breast



METHODS OF RECORDING BREAST NOTES AND SIDE NOTES

are surveyed, the intermediate breasts being measured. A clinometer is used to get the dip of the vein, which is taken at each station; this with the section of the vein at the face is recorded in the sidenotes, as shown in the accompanying illustration.

Horizontal distances and vertical heights are computed in the office and recorded in the transit notes in red ink, shown in the accompanying illustration in slanting letters. These data are then copied in the traverse book and the elevation and coördinate value of each station computed. Gurden's traverse tables are used in the latter computations and all work is carefully checked.

Levels are run with the transit when it is desirous to drive a gangway or tunnel on a special grade.

MAPPING

A high-grade mounted paper is used for the maps and all surveys are plotted on a scale of 100 ft. to the inch. Coördinate lines are drawn dividing the map into 1000-ft. squares. As each station is plotted from its coördinate value, and checked with the protractor, the possibilities of errors in calculating and plotting are practically eliminated.

As many as eight overlying veins are worked at some mines and since a complete map showing all the veins would in many cases be very confusing, separate ones are made of each. Water colors are used on all maps and tracings, a different color being adopted for each vein. Rock work and buildings are outlined and cross hatched in black; on tracings this is done on the back

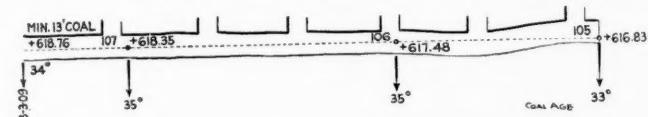
Left Page		Right Page	
Survey	of East Mammoth Gang.		
99-100 179' 36'	" See page 8	64.50	3-3-09 Smith, White, Jones, Brown.
100-101 187' 57'	OK.	39.84	Gurley Transit; No. 4. 300' Tape
101-102 179' 51'		V=0.21	For side notes see Vol. 45, Page 6
		H=	See Traverse Book 2, Page 6.
		79.07	Sta. 102 is new spad in collar 6.50 to rail
102-103 172' 07'	+0° 09' N8°00'W	210.72	Sta. 103 is new spad in collar 7.00 to rail
	+0° 12'	El. ILOW	
103-104 169' 10'	+0° 27' N8°00'W	49.76	Sta. 104 is new spad in collar 6.35 to rail
	+0° 54'	El. IHIGH	
104-105 178' 53'	+0° 54' N1°00'E	216.23	Sta. 105 is new spad in leg 5.20 to rail
	+0° 32'	El. OK	
105-106 180' 54'	N1°00'E	111.28	Sta. 106 is new spad in collar 6.82 to rail
	+0° 20'	El. OK	
106-107 181' 01'	+0° 21'	143.15	Sta. 107 is new spad in collar 6.55 to rail
	+0° 06'	H=	
107-Pt. 182' 00'	N2°00'E	56.00	
	+0° 25'	El. OK	
			COAL AGE

TRANSIT SURVEY NOTES

of the parchment. In places where the pillars have been removed the date is marked and the pillars cross hatched.

Tracings of each vein are sent to the mining engineer, state mine inspector and mine manager. The maps are all brought up to date every three months, this being the interval of time between postings. The state mine inspector's tracings are extended every six months in compliance with the state law.

The workings of the different veins may be compared by fitting one tracing over the other, which is done by making the corresponding coördinates on each tracing coincide. A separate map is made of the surface features and anything likely to be affected by the underground



SIDE NOTES IN ADJOINING ILLUSTRATION, PLOTTED

workings is plotted on the mine map. Blueprints are made from the tracings for the use of the survey parties and company officials.

When any work is to be stopped or if it is desired to give instructions of any kind to the mine foreman, he must be notified by letter or the orders are not binding. After the letter is written it is copied in a special book kept for reference. A slip is sent with the letter to the foreman, who fills it out, noting the date of receipt, and it is then returned to the engineering department and filed. By following this system the responsibility for mistakes made cannot be shifted from the engineering department to the mine foreman or vice versa.

When a breast is finished the foreman fills out a slip

showing its location, number, when it was finished and total yardage paid on it. This is forwarded to the engineering department and a chainman is sent to check the measurement. His notes are kept in a special book from which the yardage is checked and the breasts plotted. If the vein has a regular pitch the dip is taken every 50 ft., this being the length of the chain used in measuring. Any irregularities in the vein are located and noted, and the measurements are reduced to horizontal distances and recorded as shown in the accompanying illustration. As all yardage on gangways must be measured from survey stations it is easy to check this work in the office.

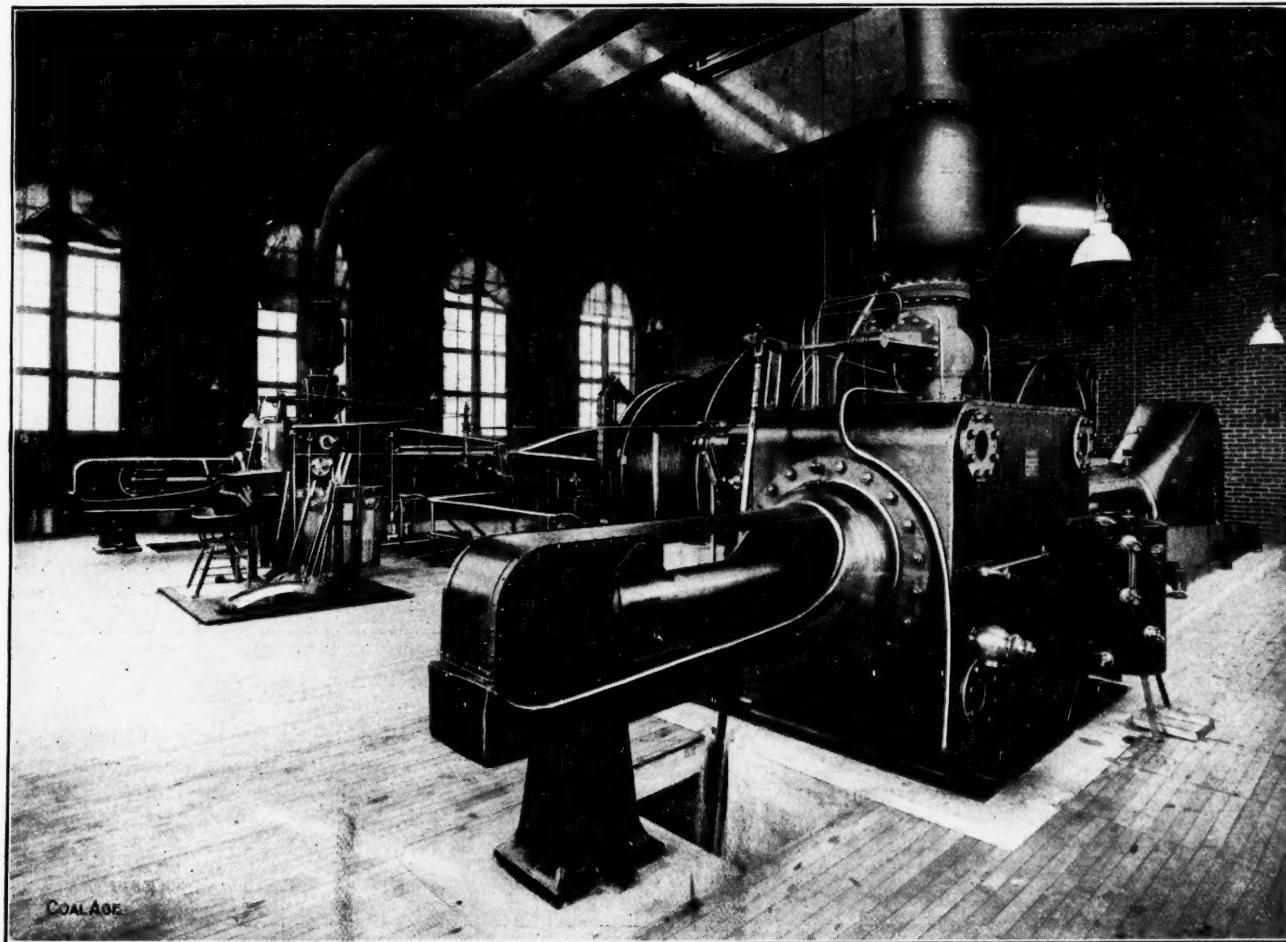
Where the surface is removed from the coal the work is generally done by contract. As the contract calls for a certain sum to be paid per cubic yard, it is the work

[It is hoped shortly to publish a detailed article on engineering practice in connection with stripping operations.—Ed.]

An Efficient Steam Hoisting Engine

Few steam hoisting engines produced within the past few years exceed in interest that built by the Vulcan Iron Works and installed at the Loomis colliery of the Delaware, Lackawana & Western R.R. Co. This hoist is driven by 34x48-in., first-motion, link-reversing, heavy-duty, Corliss type shaft hoisting engines.

The unit is provided with two conical drums tapering from 14 ft. to 10 ft. in diameter, each of which will coil



THE ENGINE AS AT PRESENT INSTALLED. NOTE THE 1-IN. STEAM SUPPLY LINE

of the engineering department to estimate the amount of material taken out. Before a stripping is started, section lines are run from a base line outside of the land to be worked. These sections are generally 20 ft. apart, although this is governed entirely by the topography of the surface. Each month the portion of these sections that has been worked are rerun and plotted. As the distance between the sections is known it is a simple matter to calculate the amount of surface removed. All scalings and computations are carefully computed, the planimeter being used as an additional check on the area of the cut at each section. As the total amount of material removed to date is calculated each month any previous errors in computations will be picked up

1300 ft. of 1½-in. rope in one layer. One drum is tight upon the shaft, while the other is loose to facilitate hoisting from different levels. The loose drum is made fast to the shaft by means of a clutch which grips a spider or clutch wheel.

This clutch is so arranged that it cannot be released until the brake is set up hard on the drum. The engines are provided with a steam reversing gear and steam brakes, with auxiliary hand-operated brakes. The brakes themselves are of the post type with a parallel motion.

Double throttles are employed, the lower ones, or those just above the steam chests, being used under ordinary conditions, while the upper or central throttle may be employed in case of emergency.

As has been stated above, the valve-gear is of the Corliss type. This is built without a governor, the trip motion being connected with the throttle lever. The engines are brought up to speed in the course of the first two or three revolutions. The throttle lever is then thrown over to the limit of its travel, and the Corliss gear which has been previously adjusted to the load being handled regulates the cutoff and continues in operation until steam is shut off at the end of the hoist.

Some idea of the quality of material and workmanship put into this machine may be judged from the fact that the reverse links are case-hardened, while the cranks and crossheads are of steel castings. The machine is also provided with through piston rods and tail crossheads, as may be seen in the accompanying photograph.

The engine is constructed to hoist 100 one-car trips per hour. The depth of the shaft is 1050 ft., the weight of the cage is 13,000 lb., that of the empty car, 3000 lb. and the coal contained therein 8000 lb.

Two overwind preventers or governors are employed, one being placed upon each drum. Two Mason regulating valves are also placed upon the cylinders. These are employed in lowering materials. Should the throttle refuse to work, the steam pressure could be equalized by means of these valves and the cage stopped. They may also be used to govern the speed of the cage when coming into the foot of the shaft.

The building in which this engine is housed is of brick with a concrete roof, and measures approximately 48x50 ft. inside. An idea of the economy of the Corliss valve-gear, as applied to a hoisting engine, may be obtained from the fact that, at the present time, the steam piping from the boiler house to the hoisting plant is not complete, and the engine is now operated upon a 4-in. temporary line, the size of the steam throttles above the cylinders being 8 in. With this 4-in. temporary steam line, loaded cars are hoisted at the rate of one per minute.

xx

Industrial Insurance by the Lehigh Coal & Navigation Co.

BY A. T. SHURICK

The solution of a method by which protection will be afforded equally to employers and employees in the event of industrial accidents is coming gradually, but steadily, into greater prominence. In fact, some of the most powerful corporations in the United States have taken the lead in this direction, as for instance, the Pennsylvania Railroad, which has materially broadened the scope of their insurance and beneficial fund propaganda in recent years, and the establishment of a like arrangement by the American Telephone & Telegraph Co. No doubt the disillusioned cynic will ascribe the adoption of these altruistic policies to the drastic anti-trust legislation being enacted by both the state and Federal governments, and the fact that many of these larger corporations are fighting for their very existence.

But, whatever the reason, all enlightened students of the subject are viewing the changed conditions with deep satisfaction. That the old system of endless litigation in the case of industrial accidents has proved not only ineffective in its results but enormously extravagant as

well, is generally agreed by all. The baleful solicitor for retainers in industrial accidents is too well known to require comment; much unnecessary litigation results from his activities, throwing additional burdens upon the taxpayers while it is a fact that the plaintiff receives but a small proportion of the ultimate award for damages.

While considerable publicity has been given to the recent developments along this line, particularly as regards some of the large outside corporations already mentioned, it is probably not generally known that equally altruistic policies have been in effect with some of the large coal corporations for more than a quarter of a century; at least such is the case with the Lehigh Coal & Navigation Co., one of the largest of the hard-coal companies operating in eastern Pennsylvania. This concern has a beneficial fund, mutually supported by the employers and employees, which has been in operation since 1884.

THE L. C. & N. CO.'S METHOD

During this interval benefits aggregating \$846,709.39 have been paid, while the administrating expenses have amounted to only \$29,168.02. It is particularly interesting in this connection to note the small ratio of the administrating expenditure to the benefits derived by the employees, these expenditures amounting to only about 3½ per cent. Had these cases been carried into the courts, it is probable that this 3½ per cent. would represent more nearly the actual damages which the plaintiff ultimately received.

The fund is supported about equally by the company and the employees, the former having contributed \$428,813.93, and the latter \$430,290.72 since the inception of the fund. The maximum cash balance ever accumulated occurred in 1893, and amounted to \$46,935.72. In more recent years the fund has apparently fallen into evil ways, a deficit ranging from \$4000 to \$23,000, showing during the period from 1902 to 1907, and again during 1911, 1912 and 1913. However, this deficit which last year amounted to only about \$6000 is apparently more than compensated for by certain securities, donated by the company in 1900, amounting to \$25,000.

The rules of the fund provide that the Lehigh Coal & Navigation Co. donate eight mills per ton of commercial coal produced, while inside men contribute 0.8 of one per cent. of their earnings, and the outside men 0.4 of one per cent. provided, however, that no workman shall contribute more than \$1 per month.

In event of injury resulting in inability to work for one week or longer, the workman receives benefits amounting to one-half his customary wages, although such payments are limited to six months except under extraordinary conditions. In case of a fatal accident, \$50 is contributed toward funeral expenses, and a sum equal to one-half of the victim's wages for 18 months from the date of the accident will be paid where there are near relatives. It is also provided that in no case shall the benefits paid exceed \$50 per month.

Adequate provisions are of course made providing for the presentation of certificates from reputable medical men, as to the extent of the injury. The fund is administered by a board of trustees, composed of responsible business men, and company officials, all of whom are appointed by the president of the company. Participation in the fund on part of employees is not compulsory.

Economic Piping

The coal operator, like many another business man and manufacturer, is constantly striving to increase his output and diminish its expenses. In no department of mine operation is this perhaps more forcibly manifest than in the purchase of material and equipment. Here, as elsewhere, however, it is sometimes difficult to break away from precedent and the custom of past years.

For the conveyance of fluids about the mine, particularly the mine water itself, ordinary iron or steel pipes deteriorate at a high rate of speed, due to the acidity of the water. Even if not attacked from the inside, if buried in soil, ashes, or mine refuse, ordinary piping frequently pits and decays from without, particularly if it is made the ground return of an electric system. Piping for these purposes must, therefore, either be of a heavy and comparatively inert material, such as cast iron, a nonconducting material, such as wood, or must be protected by an inert covering, such as coal tar.

The Abendroth & Root Co., 45 Broadway, New York City, have for some time furnished spiral riveted pipe to various collieries throughout the coal regions for the conveyance of water, air and exhaust steam. This pipe is constructed of a sheet which is wound spirally,

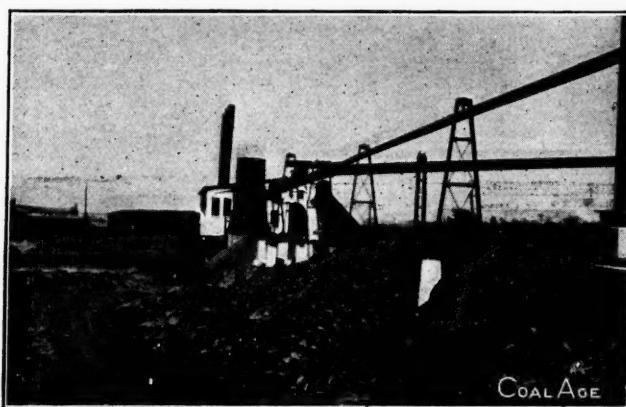
Many mine operators are strongly in favor of using spiral riveted pipe for removing foul air from the workings in place of the old-style wooden-box arrangement. Although the first cost of this pipe is slightly higher than the wood sluices, there is considerable saving in the labor of installing riveted pipe, and, in addition, the upkeep expense of wooden conduits which require continuous repairing is eliminated.

The accompanying illustration shows a plant in the anthracite region using spiral riveted pipe to convey the exhaust from the fan engine to the feed-water heaters in the boiler plant. This pipe is the lower one seen in the photograph.

Pipe of this kind either galvanized or painted is extensively used throughout the anthracite region for the conveyance of exhaust steam, since for a given strength it is somewhat lighter in weight and consequently lower in price than ordinary piping.

A New Type of Breaker Engine

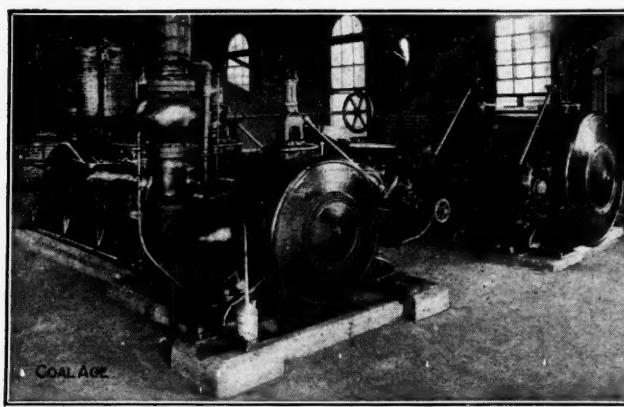
When the Kingston Coal Co. recently found itself in need of a new breaker engine, after careful consideration the Lentz engine was finally decided upon. The order for this machine was placed through the Erie City Iron



LIVE- AND EXHAUST-STEAM PIPES OF AN ANTHRACITE COLLIERY

ly, each separate turnlapping its neighbor by about 1 in., this joint being single riveted upon a comparatively short pitch. It will be readily seen that this gives an extremely strong construction for the weight of the metal employed, since the spiral seam acts precisely as does the metal wrapping of an armored hose, strengthening and stiffening the body of the pipe.

After this pipe is made up it is immersed in a bath of special asphalt coating and remains there until this material permeates the seams and pores of the metal, protecting the pipe both inside and out. This preservative forms a thick layer which will not crack or flake off and is capable of resisting hard handling. For conveying exhaust steam or hot liquids when the temperature exceeds 105° F., or for high-pressure air service, the pipe may be galvanized by immersion in pure molten zinc. This pipe is furnished in lengths of from 20 to 30 feet and this combined with the simplicity of its special connection, permits of considerable saving in installation expense, as skilled labor is not required to lay it satisfactorily.



THE LENTZ ENGINE, SHOWING A PORTION OF THE VALVE-GEAR

Works, this purchase giving that company the American rights for the engine.

The size of the engine is 19½x32½x21 in.; the machine is cross compound and provided with poppet valves. The original patents for this type of engine were issued to Hugo Lentz, the first machine being built in 1899. Since that time over 4,000,000 hp. of this type of prime mover have been installed in Germany alone.

The engine is entirely inclosed and lubricated by the splash system. No elastic or metallic packing is employed, the valve stems being kept steam-tight by a system of labyrinth water-seal packing.

The engine in question develops 360 i.h.p., and the balancing is so nearly perfect that it is possible to balance a nickel on edge upon any part of the engine casing. It is the first machine of this type ever installed in the anthracite region.

2

The flame in a boiler should not lap the tubes because flame only exists where there is incomplete combustion and the temperature of the gases should not be reduced by cooling surfaces till the gas is completely burned.

Electricity in Coal Mining

BY DAVID R. SHEARER*

SYNOPSIS—This is the fourth article of the series on this subject and emphasizes the importance of care and forethought in preliminary work before actual power-plant construction is undertaken.

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When a corporation or individual decides to open a mining operation it is taken for granted that the work will be done with the intent to make the proposition a paying investment. With this end in view careful tests are usually made and quite an amount of prospective work is done prior to regular construction. As a usual thing most of this preliminary work is done for the purpose of locating the mine shafts or drifts in the most convenient place relative to the seam of coal. The money thus spent is usually considered as an investment, and such it is, for the future economy of the mine depends to a great extent upon the location of the works relative to the coal bed.

In a similar manner, money spent in locating and designing a layout of machinery and mechanical mine accessories is usually well invested, for should some error be made by which an uneconomical operation or handling of material becomes necessary, a monetary drain throughout the entire life of the plant is entailed, unless an amount should be appropriated to make the necessary changes in the existing equipment. Thus, a dollar spent in careful design may mean many times that amount in annual savings.

Considering the matter from a business standpoint, no firm can afford to build permanently without carefully mapping out the whole plan and so designing the details entering into its construction that a maximum operating economy is assured. This statement, although pertinent to the general mine layout, applies particularly to the necessary electrical appliances, since faulty design here means either expensive changes or a continual operating and upkeep expense.

The first point to be decided upon with regard to the power plant is the most economical available source of energy. This, for a mine operation under ordinary circumstances, will be either water power or steam. If it is found possible to make an economical development of water power within a reasonable distance from the operation it will be well worth while to make a thorough investigation. In some instances if central-station power be available, it may be a matter of economy to purchase electric current and install a small substation in place of a power plant.

Frequently a coal producer overlooks the fact that he can sell the fuel he burns to supply his own power, and ship it at a profit, feeling, as he does, that his fuel costs are not worth considering. Instead of thus assuming certain cost relations for parts of the plant, the entire proposed design should be rigidly investigated and questioned as to future economy in the general operating scheme.

AN ENGINEER WILL USUALLY BE REQUIRED

This work will usually fall to the lot of some engineer

*Knoxville, Tenn.

and to it should be given the most painstaking attention. Few mine operators or owners have the technical training or engineering experience to work out logically the many details of a proposed installation. The field of the operator is to produce coal at the opening of the mine at a minimum cost with the equipment supplied. The province of the engineer, on the other hand, is to design the power plant and supervise the erection and installation of such machinery as may be necessary or advisable in order to secure a maximum production at a minimum operating expense.

We hear much of late regarding motion study in industrial enterprise, and though this method of securing economical production is often censured, there is no doubt that opportunity for realizing great gains in speed and economy by close attention to methods in handling the output exists in coal-mining work. The several parts forming the working equipment should operate as a unit, each element supplemental to the others, and working with maximum economy under given conditions.

As the writer has previously noted, a mine has individuality, practically no two being alike as to location, general contour or natural resources. It is, therefore, of paramount importance that the details be carefully planned and every feature bearing upon the future operation of the development be carefully considered before the actual work of erecting the plant begins.

The power plant is an extremely important factor in the general layout, as from it is drawn electricity for haulage, for lights, and often for fans, pumps, mining machines, and in fact for all power necessary in or about the mine. Again the cost of operation of the electrical equipment is continuous month by month. It may, of course, vary considerably during periods of greater or lesser activity, but means just so much toward gross running expenses. We find frequently that power-plant operation costs bear a greater proportion to the entire operative expenses than any other item, labor excepted.

A mine owner or operator preparing to open a new property and invest his money as well as that of other stockholders without having a well defined plan and the assistance of competent engineers, is laying himself and his company open to a great danger—that of buying and installing unnecessary, inadequate or unsuitable machinery. Frequently, however, the danger is in another direction, that of securing cheap or shoddy equipment. At either extreme may be found trouble and expensive operation, not only from the operating costs themselves, but from upkeep and repair expenses.

Too often a manager or superintendent is induced to purchase certain machines by some smooth-tongued salesman, who, of course, knows his own line better than any other, and naturally believes it to be the best, regardless of conditions to be met or previous operating experiences with the same machine. However, it is far better for the owner if the proper equipment can be determined upon in advance regardless of what the salesmen have to say concerning their various lines of accessories.

Another danger looms up in the way of the man seeking a cheap installation, that of taking advice from an

untrained or a mine-operating engineer. There are many men in charge of mining power plants who are fully competent to do their work and can secure efficient operation from a suitably designed plant, but few of the number have had the diversified training along such lines as would enable them to adequately advise regarding a new installation, or the equipment of the plant with additional machinery made necessary by expansion. It is far preferable that an outside engineer, who by continually coming in contact with various conditions in different sections of the country becomes accustomed to reason logically and plan accurately, be called upon to design the original plans and superintend installation in all its details. The operation of an engine and generator is one thing; the wiring layout, switchboard design and line-loss calculations are other matters entirely.

THE KIND OF PRIME MOVER IS IMPORTANT

The type of power to be used having been definitely decided upon, the next step to be determined is the particular kind of prime mover to be purchased, for upon this will be based the design of the remainder of the plant. If a waterwheel, shall it be a pelton, vertical, horizontal, or twin turbine, or some other type more suitable to that particular installation? If a steam-driven plant, what kind of engine shall be used, simple, corliss, compound or turbine? And what kind of boiler or boilers shall be employed, or which of the many makes of pumps and accessories? Shall the generator be a.c. or d.c., belted or direct-connected, high or low voltage? What switchboard equipment will be necessary for this particular plant? What accessories will add to economy or satisfactory operation?

All such questions come up and must be definitely settled. The failure to consider any one factor may detract from the economy of the complete plant, and it is upon the efficiency of production that we must depend for dividends. It is true that one may place almost any kind of layout in operation and may secure some sort of service from the equipment, but there might be other equipment from which it would be possible to secure a maximum efficiency, and it is that plant that should be installed.

First cost, though it looms large to a promoter, is not the final test of plant expense, but is merely a basis from which to start. A better method of calculating costs is to assume a certain useful life for the mine development, based on the report of mining engineers or those thoroughly acquainted with the territory and location of the coal seams, and install equipment which experience and careful calculation indicate to be the most economical over the assumed period of time as a whole. All the items of expense and of possible economy must be followed out to their conclusion and a design of the proposed plant should be drawn adapted to given conditions. If, after careful consideration, no weak points are found in the layout, it is taken for granted that the designs are suitable and the work may be commenced.

This is an age of specialization, and no man can expect to master the details of several branches of learning. Even were it possible for him to do so, he could not gain experience in more than one pursuit at one time. Thus, the outside engineer fills a distinct and necessary place in the mining industry. It is the primary business of the mine owner to take the equipment as turned over

to him and produce rapidly, economically and continually, but it falls to the engineer, electrical, mining, civil or mechanical, to carefully work out the multitudinous details to be accounted for and overcome the obstacles or mistakes that otherwise might be in evidence.

This is not written for the purpose of eulogizing the engineering profession, but to call attention to the fact that any mining power plant, or any other plant for that matter, requires for its design experience, knowledge, time and careful thought, if a maximum operating economy and a minimum upkeep expense are to be obtained.

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D. A. Thomas at Home

The "Liverpool Journal of Commerce" under date of May 26 publishes the following interesting interview with the British coal baron, D. A. Thomas:

In regard to the enterprises of D. A. Thomas in the United States, very little of a definite nature can be stated. There is reason to believe, however, that the famous British "coal king" has substantially matured the basis of a remarkable organization for setting alive the exploitation of great coal-yielding areas on modern lines and under processes of administration which are the outcome of his personal experiences. This aspect of the projects of D. A. Thomas will probably lead in the course of a year or two to a complete revolution in the world's coal industry.

Transport Enterprises

On the subject of his journey D. A. Thomas accorded a special interview today to a representative of the "Journal of Commerce." Concerning the Canadian side of the matter he said:

"With regard to railway and other projects in Canada, my associates and myself have completed several important and definite arrangements. We have secured a franchise charter for the Pacific, Peace River and Athabasca Ry., and also for the Peace River Tramway & Navigating Co. The former will be capitalized to the extent of £3,200,000, with bonding privileges of £10,000 per mile. The latter concern will be capitalized at £200,000, with bonding privileges of £7000 per mile. We have organized and equipped half a dozen parties of engineers and others, who are about to proceed on a reconnaissance and track surveying in order to locate the coal lands, minerals, etc. This work will occupy them three or four months. Adequate financial provision has been made for the necessary work during the coming 12 months. These projects will ultimately cost large sums. I expect to be able to proceed with the Peace River Tramway next year. I may say that this project also provides for the construction of several shallow draft river and lake steamers. The railway will traverse a country lavishly endowed both agriculturally and mineral—millions of acres of land growing the finest wheat in the world, with large areas of coal lands and minerals and indications of various kinds of natural gas and oil."

The Navy and Oil

"As oil is going to be one of the chief requisites of the navy, the discovery of oil in Canada will be highly important. It is possible, if not probable, that these projects will develop thousands of square miles and stimulate immigration. The significance of this will be so well understood in view of the fact that the government contemplates purchasing interests in the Persian Oil Syndicate. Of course, I do not know what supply will eventually be available, but the scientific investigations which have already been made show that the oilfield that we are about to tap will be undoubtedly the richest in the dominions of this empire."

Revolutionizing the World's Coal Industry

Mr. Thomas declined courteously, but firmly, to discuss any details concerning his projects in the United States. There is every reason to believe, however, that he has been consulted by enormous holders of colliery interests in the States to formulate a scheme by which the vast coal-yielding resources of that continent may be worked on economic lines such as prevail within the organization of the Cambrian Trust.

Mr. Thomas did not confirm or repudiate this suggestion when it was put to him. Information from reliable sources goes to indicate that during his visit he has received amalgamated offers to organize a dominant section of the United States coal areas and to put into force his masterly knowledge of the working conditions, and of export avenues. In a few years there is reason to believe that the crowning work of his life may possibly be, with the coöperation of American colliery owners, the establishment of a great United States coal combine which will, through the aegis of the Panama Canal, supply the Far East with the bulk of its coal. It is obvious that such a stupendous undertaking will revolutionize the coal industry of the world.

Since President Wilson has advocated the antitrust act, the formation of such a combine would appear to be a difficult proposition, but the importance which the United States attaches to Mr. Thomas' scheme has raised the consideration of the important point as to the meaning of a trust.

We have reason to believe that the comprehensive combine which Mr. Thomas is invited to control will have as its cardinal feature the reduction of prices, and will, therefore, be claimed to be outside the spirit of the antitrust laws.

Mr. Thomas was reluctant to discuss this question, but we have good authority for believing that the United States Government has under consideration legislation which will permit of Mr. Thomas carrying through a project which will place the United States next to Great Britain as a coal supplying center, and will almost guarantee for it the trade of the Far East.

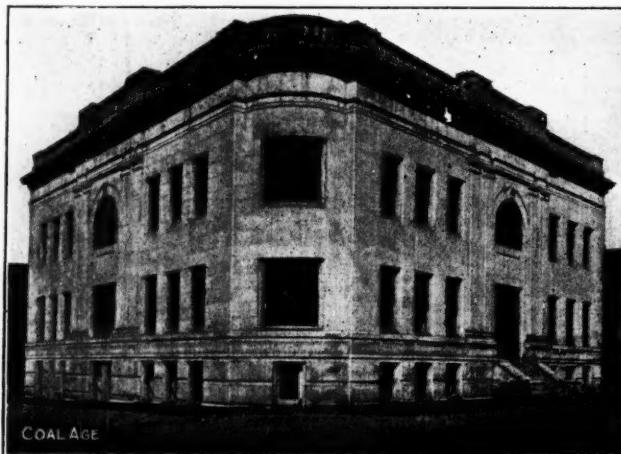
The West Virginia Coal Mining Institute

SPECIAL CORRESPONDENCE

SYNOPSIS—The Institute met at Cumberland, Md., and discussed more fully than usual papers of more than usual merit. The question box was a source of much animated discussion. Owing, however, to Cumberland being at the edge of the West Virginia-Maryland field and a hard place to reach from the southern coal regions, the attendance was not as large as usual. The next meeting will be held in Huntington, W. Va.



The West Virginia Coal Mining Institute met in the city hall of Cumberland, Md., on the morning of June 2. An address of welcome by Major Thomas W. Koon, mayor of Cumberland, was followed by another on behalf of the chamber of commerce, delivered by Thomas Footer, its president. Responses were made by J. B. Hanford, general superintendent of the Elkins Coal & Coke Co., of Morgantown, W. Va., and W. E. Fohl, consulting engineer of Pittsburgh. Neil Robinson, the president, then followed with an address, in which he urged the members to read the technical press with assiduity, so as



THE CUMBERLAND CITY HALL WHERE THE WEST VIRGINIA COAL MINING INSTITUTE MET

to prepare themselves to meet all the developments of the industry.

A paper entitled "The Historical Side of the Georges Creek Coal Field" was then read by R. A. Walter, chief engineer of the Maryland division of the Consolidation Coal Co. The paper was discussed by Herman V. Hesse, general manager of the same division and W. P. Young, superintendent of inspections for the Consolidation Coal Co., residing at Somerset, Penn. The paper of Clarence Hall on "Explosives Used in Coal Mining," which appeared on the program, was not submitted and Mr. Hall was not present.

ANIMATED QUESTION-BOX SESSION

In the afternoon, P. J. Brennan, superintendent of the Davis Coal & Coke Co., Thomas, W. Va., read a paper entitled "The Necessary Training for Mine Officials," and then the question box was opened. It resulted in a most

animated controversy, in which John G. Smythe, chief engineer of the Consolidation Coal Co., took a leading part. W. E. Fohl, E. N. Zern, W. P. Young, E. B. Wilson and P. J. Brennan also made interesting remarks. The three main questions were:

1. Which is the safer mine—one that is fiery, so recognized and guarded by the use of safety lamps, permissible explosives, compressed air as a motive power, paid shot firers, effective methods of treating dust, rigid discipline, etc.—or a mine where gas is found occasionally at any part of the mine, or continuously at certain sections of the mine, and operated as a mine of lesser risk, preventive measures being used in proportion to the believed danger?

2. Should ventilation be based on a stated number of cubic feet per man and animal underground, as at present required by the mining laws, or should it in addition be based on the quantity of methane and carbon dioxide shown by analyses of return-air currents?

3. Which is the proper method of setting a post—the small or the large end up?

In the evening the moving pictures made in the mines of the U. S. Coal & Coke Co., at Gary, W. Va., were run off for the entertainment of the members. The film is a replica of that which has been so generally exhibited throughout the country, and is owned by the University of West Virginia, Morgantown, W. Va.

On the second day, a visit was made to the station where the Cumberland & Pennsylvania R.R. discharges the Georges Creek coal into the barges of the Canal Towing Co., plying between Cumberland and Georgetown, on the Chesapeake & Ohio Canal. The boats carry an average of 17 tons and are each hauled by 4 to 5 mules, taking about 9 days for the return trip. The boats are loaded from a trestle, the front end being first filled about half full; the rear end is then loaded and the front end is then backed so that the trimming load can be placed.

SECOND DAY'S SESSION

After this inspection the institute met again at the city hall and heard a paper read by George E. Sylvester, chief mine inspector of the State of Tennessee, followed by one on "What Shall Be Considered Maximum Recovery with Modern Methods of Mining Bituminous Coal?" by E. W. Hesse, assistant chief engineer, Fairmount division, Consolidation Coal Co. In the discussion which followed, W. E. Fohl explained that one of the real reasons why Ohio had an incomplete recovery was because the union insisted on a room not less than 25 ft. wide with a road passing up the middle. Such a condition, especially with any refuse in the coal to be stowed made recovery of the pillars impossible.

F. C. Benner, special secretary of the Industrial Department of the International Young Men's Christian Association Committee, then made a plea for the co-operation of the mine owners in his work.

The paper on "Sanitation and Simple Ways of Making It Effective," by Dr. Robert Douglas Roller, Jr., surgeon for the New River Collieries Co., Eccles, W. Va., was eminently practical and not a series of abstruse platitudes about the importance of prophylaxis. Doctor Roller said in the discussion that he had only found two cases of

hookworm in Eccles, and these two were in country people who did not work in the mines. He did not believe that the hookworm could germinate in the coal mines of America as long as they continue to be as shallow as they are today. In any event, the development would not be menacing for the larvae would be hindered in their growth.

The president gave an interesting account of the sanitation he is effecting as receiver for the La Follette Coal, Iron & Ry. Co. Some of the houses of that company he found had a most unfavorable record for tuberculosis and every precaution to render them safe by fumigation and whitewashing within and without had been attempted and he felt confident that success had been attained. Water analyses should not only be taken during low water, when the inflow might be wholly from springs, but during rainy weather when the stream or spring is swelled by surface water.

THE MOST RECENT WORK ON EXPLOSIONS

In the afternoon, George S. Rice, chief mining engineer of the Bureau of Mines, described "Recent Experi-

explosion alone being able to dislodge the dust which remains.

THE BEST STONE DUST TO USE

Mr. Rice advocates the use of limestone because it emits, on being heated, carbon dioxide, which stifles the flame. It is, he admits, heavier than shale dust, which fact militates against its use, and experiments have not as yet shown for it any appreciable superiority. However, shale dust often contains a large percentage of vegetal matter, and so is not entirely inert. The fact that limestone dust is already on the market and shale dust at the present time is not, makes the former the more desirable.

R. D. Hall was of the opinion that the heat of dissociation of shale and limestone dusts into clay and moisture, and lime and carbon dioxide, respectively, were far more important considerations than what was the end product. Shale dust contains, so to speak, "tabloid moisture," which, being driven out of combination, absorbs much heat in that action.

E. B. Wilson then read a paper on "The Adaptability



NEIL ROBINSON, PRESIDENT W. VA.
COAL MINING INSTITUTE.

No. 12, OR THE OLD BORDEN SHAFT,
CONSOLIDATION COAL CO.

E. N. ZERN, SECRETARY-
TREASURER

ments on Coal Dusts," in which he showed that while the vacuum after an explosion caused a return draft, a still more violent reversal of direction of violence arose from the culmination of pressure in the explosion at a point remote from its origin. When this maximum pressure was created, it was so much greater than preceding pressures, that the air and solid objects were driven forcibly backward into the areas of lower pressure in the rear.

He also made some remarks on the disagreement between the results of the American and British bureaus relative to the action of anthracite dust. Mr. Rice's statement was carefully guarded, but it was evident that he believed that the variance in results arose from the difference in the anthracites here and abroad rather than in a variation in the methods of experimentation. The British authorities have declared that while inflammation proper is dependent on the volatility of the hydrocarbons in the coal dust, detonation of a carbonaceous dust is possible regardless of the presence of volatile constituents provided the powder is sufficiently free from inert material.

Mr. Rice introduced several drawings of concentrated Taffanel barriers, which were boxes of stone dust arranged to trip and be discharged by the revolution of a vane, which in turn is to be actuated by the explosive waves. All the dust is not discharged at once, the full violence of the

of West Virginia Coal for Byproduct Coking," and A. D. Macfarlane, chief engineer of the La Follette Coal, Iron & Ry. Co. described "An Endless Rope System for an Inclined plane." These two papers were not much discussed, though it was remarked that the system of haulage described in the latter paper involved the leaving of cars on the plane at all times, during operation or idle periods, and that the rope had to be stopped whenever a trip was to be attached.

THE AFTER-DINNER SPEECHMAKING

In the evening a banquet was held at the Y. M. C. A. of the Baltimore & Ohio R.R. W. E. Fohl was toastmaster. Neil Robinson gave one of those carefully polished addresses for which he is well known. He was followed by A. Taylor Smith, a lawyer of Cumberland, and C. R. Jones, dean of engineering at the Morgantown University.

The latter compared the past with the present; the scholars of the past were secretive and moreover believed that knowledge should not be debased to practical ends, the men of the present believed in making public all that scientists discovered and valued all such knowledge for its practical bearings. The end of science was now not secrecy nor self-advancement, but social service.

R. D. Hall, associate editor of COAL AGE, then followed with a regret that business conditions were making it

natural and even imperative that the operator and his employee should not live in the same towns. Living together, as in times when the difficulties of transit permitted no other course, assured the betterment of both, and gave to each a clearer realization of one another's nature and needs. He urged a consideration of this estrangement, which tended to break up the solidarity which should exist between capital and labor. To prevent absenteeism from having its natural effect in alienating capital from labor, and labor from capital, welfare work must be pursued with energy equal to that with which it is naturally prosecuted when employer and employee live side by side and know each other's natures and needs.

W. P. Young, superintendent of inspection of the Consolidation Coal Co., Somerset, Penn., spoke of his trip to Argentine and Brazil to convince the South Americans that the coal of the United States would really burn, in which, of course, he was quite successful. As his speech was a travelogue rather than a description of the coal business in those countries, there is no need to discuss it further.

The addresses so far given had been interesting yet a little prosy. It remained for the director of the Y. M. C. A., William C. Montignani, to liven up the spirits of the auditors with some excellent jokes and lively singing. In a half hour Mr. Montignani completely removed the solemnity from the occasion with his clever entertainment. The supper furnished was most creditable to the ladies who supplied it.

VISITS TO SURROUNDING POINTS OF INTEREST

On Thursday the institute started, at 7 a.m., by street car, for Frostburg. Some of the members visited No. 1 and some No. 12 mine of the Consolidation Coal Co. The latter is the old Borden shaft. Some of the timber in these workings has been in place about 34 years, during 29 years of which it has been under water. Wherever it rose and receded in the shaft, the timber had rotted entirely away.

The old hoist, built by G. W. Snyder, of Pottsville, Penn., in 1872, is still in effective service and lowered the visitors in the mine. They walked from No. 12 underground to No. 3 mine, and inspected the Pittsburgh and Lower Sewickley (Lower Tyson) seams and returned to the surface by the pump shaft.

The afternoon was spent in automobile riding and in visiting local plants near Cumberland. The first inspected was that of the West Virginia Rail Co., where large railroad rails are rolled down to sizes ranging from 8 to 40 lb. per lineal yard.

KIND OF RAILS REROLLED

The rails purchased by a coal corporation are probably never tested; on the other hand, rarely is rail purchased by a railroad without test. Consequently, the product of the West Virginia Rail Co. is a tested rail. Of course, there are flaws even in such rail and the use of the steel in actual railroad use brings out these defects. If a rail has slivered or cracked, the rerolling process of the rail company makes its condition worse instead of better, and consequently all such rails are thrown out and sent to mills where they can be melted. The heat used by the company at Cumberland is enough for rolling but not for welding a break.

It is claimed by the company that the continued pounding of the railroad track makes the steel dense, and that its condition is further improved by the rolling in the mill, where it is reduced in weight per lineal yard from 60 to nearly 90 per cent. The rails brought into the mill are some of them bessemer, and some openhearth, and a load ready for heating which stood on the track were old John Brown rails from Sheffield, England, which are known never to have flaws and which were made by an undiscovered process. The material being thus mixed some of the rails must be of steel far superior to that out of which ordinary mine rail is made.

PROCESS OF REROLLING

All the rail is knicked and broken to the required lengths. All rail which is slivered, cracked or piped is cast out. The length cut off is a little more than enough to form a longer rail of the lighter weight desired. The short sections of rail thus obtained are placed one by one in a furnace, where they are heated by natural gas. When a new rail is put in at one end of the furnace, a ram is actuated which pushes the rails toward the other end and discharges a heated rail ready for the rollers.

The rail is passed through the rolls about 7 times and then is sorted carefully into first, seconds and rejects. If the rail being rerolled is badly defective, it will open out and refuse to pass through the rolls. Seconds are rails having a roughness on their edges. Otherwise they have no defects.

On the automobile trip to the country a heavy storm drenched the visitors, and most appropriately their entertainers, the chamber of commerce, took them and their soiled garments to Footers' Dye Works, which the institute members examined with much interest.

About 100 members attended the meeting. It may be stated that the institute attendance would have been larger and more representative had it not been held at Cumberland, Md., but rather in the heart of the West Virginia field. However, Cumberland well merited such a visit, as the members from Maryland are quite numerous in the West Virginia Coal Mining Institute.

Another reason for a somewhat smaller attendance than usual was the engrossing labor trouble in the Kanawha coal fields, causing 12,000 men to lay down their tools. This materially reduced the number of members from Charleston, W. Va., and the vicinity. On an invitation of the chamber of commerce and as the result of a vote of a recommendation from the institute to the executive board, the winter session will be held at Huntingdon, W. Va.



A Novel Shaft Lining

Marcel Gillieaux of Liege, in the 1914 number of the *Annales des Mines de Belgique*, describes an interesting method of lining shafts with molded blocks of reinforced concrete. After reviewing the systems of shaft linings in wood, brick, cut stone, cement and metal, the author states that his system was the result of an effort to overcome the well known objections to which all these are open; and he claims complete success in the practical operation of his plans.

Figs. 1 and 2 show a vertical and a horizontal cross-

section of a shaft lining, borne by a strong, annular block of reinforced concrete, set just below the shaft opening, as shown at 4, an iron ring 5, distributing the weight of the lining over a large bearing surface. This collar or block of concrete is laid as soon as the shaft has been sunk far enough to permit it; and the shaft lining then proceeds, following the sinking of the shaft as closely as is practically possible. The lining is constructed of sectional blocks which hook into each other, see Fig. 1. In Fig. 3 a vertical section of the block is shown exhibiting the reinforcement and the goosenecks by which adjacent blocks interlock. The dimensions of Fig. 3 are

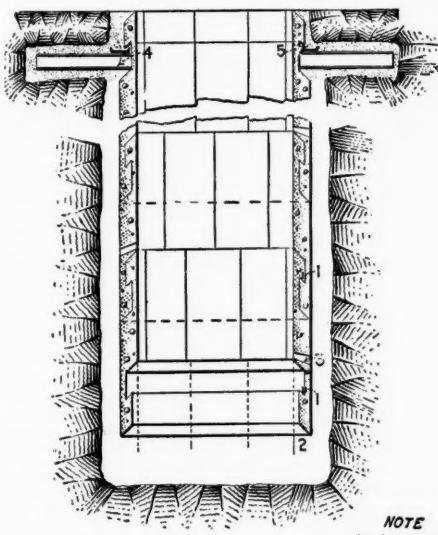


FIG. 1.

NOTE
All dimensions
are given in
millimeters



FIG. 2.

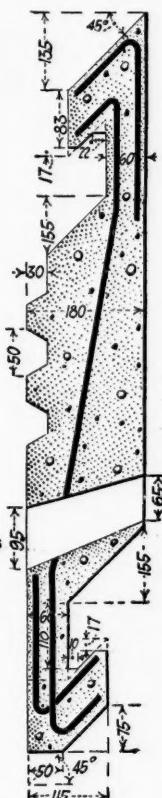


FIG. 3.

A SUSPENDED REINFORCED-CONCRETE SHAFT LINING

in millimeters; the millimeters representing, say, 0.04 of an inch. The opening at 3, Fig. 1, serves a double purpose; it allows the block, and consequently the lining, to be centered by iron bars passing through to the inner side of the shaft, and it serves as a channel to run cement between the shaft and the lining, when the lining has been extended to the required depth. In this way, the completed shaft has a solid lining of cement.

The other construction details, such as the form or mold for the blocks, special forms for locking or completing the cylindrical lining, cradle for handling the blocks, and so on, are treated at considerable length.

Gillieaux claims for his plan, that it can be constructed without the hazards to the workman which go with a lining built from the bottom upward; that it lessens the water in wet shafts; that the lining is homogeneous and equally strong at all points and that the shaft is completed and ready for operation with little loss of time, as the lining goes in while the shaft is being sunk.

The Reliability of Electric-Acoustic Signals in Mines

H. Kliver, of Bochum, Westphalia, Germany, writing in the Jan. 24 number of *Glückauf*, on the causes of failure of electric signals in the Dortmund, Westphalia, mining district, states that it has been noticed that, at times, the signaling system went wrong; either the signals were not received when sent, or the bells rang of themselves, without any action of the attendants. As such irregularities might lead to serious accidents, the management of the mines ordered an examination and report to be made, of every instance of failure within a certain period, with its cause, the means taken to remedy the trouble and the result. A frequent cause of trouble was found in water reaching the wires through defects in the insulation, leading to voltage loss, short circuits and weak currents.

In the summary for 1904, with few exceptions, all the troubles came from defects in the installation or the upkeep, such as defective cable joints, defects in the cable, bell not tight, poor cable insulation, loss of voltage and defective contacts. In a few instances, the signals were not transmitted correctly on account of being sent too hastily.

DEFECTS FINALLY RESTRICTED TO BELL MECHANISM

A comparison of this summary with that for 1913 shows that closer inspection had taken care of nearly all these troubles, which now seemed due to too rapid sending, almost exclusively. Nevertheless, the underlying cause for the bells not ringing was found to be in the striking mechanism not being sensitive enough to follow the magnetic action, even with a good contact. This led to the exclusive use of single-stroke (gong) bells.

Still the evil was not overcome entirely; occasionally the bells missed. Further study disclosed that, to insure perfect reliability, the hammers must be exactly equal in weight and length, and must hang in the same position, and the magnetic coils must be of equal strength. Moreover, it was observed that the mechanical and electrical resistances of the ringing mechanism changed, and that some bells rung more easily than others, after a little use, although both were equally sensitive in the beginning. This led to the adoption of a regulating device.

Mr. Kliver concludes that every reliable signal installation must meet these conditions:

(1) All the apparatus should be inclosed in water- and air-tight boxes; (2) the single-stroke bells (which, in Belgium, must consist of a solenoid attracting one end of the hammer lever, the other end striking the bell) should satisfy these requirements: (a) offer equal resistances mechanically and electrically; (b) be sensitive enough to strike at least four blows a minute; (c) be provided with adjusting devices to maintain a constant sensitiveness; (d) be so contrived that under no circumstances could the hammer strike without human assistance; (3) the transmitters should give a complete, perfect contact.

Panama Canal and the Coal Markets

The second of Mr. Wadleigh's articles on "Effect of Panama Canal on World's Coal Markets" was crowded out of this issue, but will appear next week, June 20.

Who's Who in Coal Mining

Charles Enzian

Among the younger men in the coal industry who have advanced to a position of prominence through strict application to work in their chosen field, is Charles Enzian, mining engineer of the U. S. Bureau of Mines. He is in charge of mine accidents and mining methods investigations in the anthracite region.

Mr. Enzian was born at Weissport, Penn., in October, 1877. His early education was obtained in the public schools of Pennsylvania, which preliminary training was



COAL AGE

CHARLES ENZIAN

followed by a four-year regular course in Lehigh University, where he was given the degree C. E. in 1901. The same institution honored Mr. Enzian with an M. S. degree in 1913.

Charles Enzian was particularly fortunate in obtaining considerable practical experience in engineering prior to his graduation from Lehigh. From April, 1894 to February, 1897, he was assistant to the county engineer of Carbon County, Penn. The work here consisted principally of surveying, municipal and county engineering.

During the summers of 1898 and 1899, he was construction engineer, working on plant extension for the Atlas Portland Cement Co., Northampton, Penn. During the summer of 1900, he was superintendent of con-

struction, building a 2000-barrel cement plant for the Alpha Portland Cement Co., Alpha, N. J.

Immediately following his graduation from college in June, 1901, he accepted a position as engineer and superintendent for the Lehigh Coal & Navigation Co., and the Allen-Crane Water Co., at Catasauqua, Penn. Most of his time while serving in this position was taken up with explorations, water-storage supply and extension of distribution service lines.

In April, 1902, Mr. Enzian accepted a position as transitman and district engineer in charge of surveys at several collieries of the Lehigh Valley Coal Co., Wilkes-Barre, Penn. In this work, he also secured valuable experience in breaker construction, being employed for a time as resident engineer in charge of construction at one of the newer breakers of the "Valley" Co.

In November, 1905, Mr. Enzian was advanced to the position of division engineer, in charge of the Wyoming division of the Lehigh Valley Coal Co. In carrying on this work he had a corps of 25 assistants, and was responsible for surveys, maps, reports, developments, improvements, etc. While in this position, he also made a number of company examinations and valuations. He continued to serve the Lehigh Valley Coal Co. as engineer, in charge of its most important division, for five years, only deciding to leave them for the broader experience he hoped to obtain in the employ of the Mining Bureau.

Mr. Enzian has always been a diligent student of coal-mining problems and matters generally concerning his chosen profession. He is prominent in many mining and engineering societies, being a member of the American Society of Civil Engineers, the American Institute of Mining Engineers, The Engineers' Society of Northeastern Pennsylvania, National Geographic Society, Wyoming Historical & Geological Society, Wilkes-Barre, Nanticoke, Pittston, Scranton and Hazleton District Mining Institutes, Coal & Coke Committee, American Institute of Mining Engineers, Franklin Club, Wilkes-Barre, Penn., Hazleton Club, Hazleton, Penn., and Home Club, Washington, D. C. He is also secretary of the recently organized Anthracite Section of the American Institute of Mining Engineers.

In a literary way, Mr. Enzian has done creditable work. He is the author of the U. S. Bureau of Mines, Bulletin No. 60, Hydraulic Mine Filling in the Pennsylvania Anthracite Fields. He has contributed frequently to COAL AGE and other technical journals and was collaborator on the Pennsylvania State Anthracite Mine Cave Commission Report of 1913. He is now serving as a member of the Pennsylvania State Anthracite Mine Cave Commission, which body was created to suggest a satisfactory solution of the serious problem of supporting the surface buildings over mines in the anthracite field.

But few of the younger men in the hard-coal regions are as well informed on the art of mining anthracite as Mr. Enzian, and the Bureau of Mines is fortunate in having availed themselves of his experience and service.

Editorials

The Kanawha Dispute

In the Kanawha district a peculiar situation exists. The operators have conceded everything the miners demanded except the check-off—everything in the union's program but the one illegal item. That demand most of the operators refuse to grant. Those who have submitted have been coerced by a boycott, as illegal as any of which the Standard Oil Co. has been guilty.

But this situation is not strange. What is peculiar is that the Department of Labor seriously is about to debate the difference between operators and miners, to decide in fact if the Sherman Anti-Trust law should or should not be obeyed, whether the companies should be, not only permitted, but almost compelled by one government bureau to violate the laws of the National Government and affront the Department of Justice.

We have never, be it understood, been violently opposed to the check-off. It was, we felt, a violation of the law, but we thought it was natural that the companies, hobbled by the union scales and conditions, should wish others to be similarly crippled and make the going equally hard for all. In short the illegality of the check-off appealed to our intellectual rather than our moral sense.

And so long as the check-off resulted only in agitation, in the laying off of the plants of the nonunion companies, no one objected strongly to its existence except those who suffered from the continued discontent the union fostered among their men.

Perhaps these outstanding opponents of unionism did not pay equal wages with other regions. Perhaps their coal was not more easy to dig or more readily loaded or less free from slate, and, therefore, should not be worked at a lower scale. Perhaps if conditions were exceptionally favorable, the differences in the labor involved had been excessively evaluated in writing the scales. These uncertainties furnished an excuse for collecting subsidies to upset the orderly working of neighboring mines.

So the agitation might be justified after all, if not by the letter of the law, at least by the spirit of equity. Beside the check-off never was an invention of the operator, nor did he ever favor it, despite all that has been recently said to that effect. It was forced upon him, but his resistance was never so strong as it would have been had he not recognized that it had a promise for him of a balancing of conditions between his own and other fields. Of course, the unionizing of his neighbor's collieries rarely helped him in the end as much as he expected, for the differentials existing at the time when the organization took charge were always recognized by the union and will be so acknowledged to the end of time.

But there is now a strong feeling against the check-off; now that it is realized that it is not a mere agitation but a war fund. It does not merely waste the money of the miners; it results in bloodshed. It is no longer a trifling with law, but an offense against morals: an unholy thing.

It is this subsidy to anarchy which the Kanawha operators are asked to provide, and the Department of Labor, by its board of conciliation, is to consider. We do not understand where there is room for consideration. Are the laws of this country to be submitted to a conciliation committee of three appointed by one man, the Secretary of Labor, who himself is appointed by the President? Where do we, the people, appear? Where are our legislative rights?

Strange things are happening, but stranger, indeed, will be the result if the board of conciliation demands that the operators collect from unwilling workmen a fund to promote warfare in Colorado and West Virginia, and a fund which tends to make the industry despicable from the Atlantic to the Pacific.



West Virginia Mine Outputs

Efficiency and conservation have received an immense amount of consideration recently, and West Virginia easily leads in the conservation of coal resources. It would be hard, however, to award any state the palm for efficiency.

We believe, however, that by concentrating efforts on these desirable factors in production, there has been a decline in the interest in large outputs in some parts of the country, and West Virginia is a conspicuous example of a state which produces large quantities of coal only by the undesirable method of operating a great number of small mines. In 1894 there was a single mine, Big Soldier, near Reynoldsville, Penn., which daily produced about 4000 tons. It is strange that today there are whole states which cannot show any such production passing over one tipple. Pennsylvania is perhaps the leading state in obtaining such results.

The trouble is largely psychological and not the fault of equipment or lack of knowledge. If the belief is present of the possibility of running a large tonnage, the hope of accomplishment spurs the managers on, and if the mine is properly equipped, the tonnage desired can usually be obtained. Let us quote the leading tonnages from West Virginia in 1912:

LEADING WEST VIRGINIA TONNAGES, 1912		
Company	Mine	Tonnage
Virginia & Pittsburgh Coal & Coke Co.	Kingmont	590,252
United States Coal & Oil Co.	Island Creek No. 1	479,631
Jamison Coal & Coke Co.	Jamison No. 8	476,470
Federal Coal & Coke Co.	Federal No. 1	451,032
Houston Coal & Coke Co.	Houston Nos. 1-2	443,221
United States Coal & Coke Co.	United States No. 9	435,275
Gulf Smokeless Coal Co.	Tams Nos. 1-2-3	401,281

It will be noted that many of the largest coal companies are excluded from this list, not one of their mines reaching the required output of 400,000 tons per annum. Yet many of these companies mine coal by drift and could have a large tonnage if they were really so disposed. Conditions are quite favorable for large development and, in fact, when we look at some of the mines, we cannot avoid the conclusion that when they were constructed big tonnages were expected from them.

But in trapper boy and manager, the doubt in the possibility of achievement is implanted. They all feel it is hard to produce more than a few hundred tons per day. We trust that the figures we have obtained of the Pennsylvania and Illinois tonnages, which we are about to quote, will awaken in West Virginia a desire to make the present plants more efficient and to lay its dependence on the mines opened and not in adding new mines where none are needed.

In Pennsylvania about 2.44 times as much bituminous coal is mined as in West Virginia. Yet, whereas in the latter state there were seven plants mining over 400,000 tons per year in 1912, in the northern state there were in that same year 103 tipples having over that production. Vesta No. 4 alone produced 1,555,420 tons and Iselin tippie dumped from mines 1, 2, 3 and 4, 1,776,410 tons, and the whole state had 23 bituminous-coal tipples producing over 590,252 tons, the largest output of any tippie in West Virginia.

In Illinois, most of the mines are operated by shafts and consequently the tonnage is restricted by that fact. The state produced in 1912 about 10 per cent. less coal than West Virginia. Yet in that year 25 tipples in Illinois each produced over 400,000 tons. That is, there were over three times as many of these larger producers as in West Virginia. And in addition it may be said, that there were five plants each producing more coal than any single plant in that state.

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Rambling Mines

In late years there has been a commendable tendency to reduce the area of coal workings opened and to endeavor to get a large tonnage from a small block of coal operated energetically. This does not involve the use of small pillars, because a larger tonnage in a given area can be obtained with large pillars completely extracted than from the same area with small pillars which have to be left undrawn. In fact, large pillars extracted by a retreating longwall system will give under proper management a maximum intensity of operation.

Such concentration of effort results in better supervision with consequent greater safety in operation, better coal product, more certain withdrawal of props, pipes and rail and more equal mining conditions throughout the mine relative to coal thickness. It saves the purchase of much pipe, rail and bonds, and decreases the amount of ventilating current needed. As few headings have to be maintained, steel cross-bars are not prohibitively expensive and if wood is used the spores generated in a labyrinth of old rooms do not impregnate the new timber.

Congestion of traffic has its difficulties also, but they can be met and as the area to be controlled is smaller, the needs of the situation can be better provided than in a mine with workings spread over a larger area. It does not pay to draw coal from a half dozen small distant sources to one common breaker or tippie. Better is it to concentrate on one particular section of the field, exhaust it and move on to another. By the time the first place is worked out, the breaker or tippie may be entirely out of date and the tearing down will be a source of profit.

It has been customary in the past whenever more tonnage was needed to put in a new opening, whereas intensification of activity in one established plant would be far more profitable. The desire to build a brand new

tippie, to escape the mistakes of another superintendent, to do something spectacular is too strong among mining men. The effort and money spent in the new outfit would often have more effect if expended in giving support to the plant already in being.

The coal we have not worked, the facilities we have never tested urge us to new locations and entirely new projects. But the old mine, if it cannot be abandoned, may as well be rejuvenated as allowed to continue its existence as an unhappy second to a brand new plant.

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Governor Cox Now Favors Ohio Operators

Governor James M. Cox arranged with operators and miners to leave the settlement of the Ohio strike to a committee, to be appointed following the adjournment of the joint convention in Columbus last Friday. The governor is now said to be out of harmony with the miners on the mine-run law. He has declared his allegiance to Ohio operators in their fight against the mine-run wage contract and advance asked by the miners, and assured the operators that he will support them in obtaining a contract as fair as the wage agreement in Pennsylvania.

Attorney-General Hogan has rendered an opinion that a contract calling for payment of miners on the basis of 99½c. for all coal passing over an inch and a quarter screen and 2c. a ton for the fine coal, is legal and within the meaning of the screen-coal law. Governor Cox has put it up to the miners to either accept this offer or shoulder the blame of prolonging a disastrous strike. He calls attention to the fact that they agreed to make the same contract with Ohio as that made with western Pennsylvania operators and that they would also enforce the mine-run provision on all if the law was passed in Ohio. The governor feels he has been tricked and is now out to repair the wrong that has been done to the Ohio operators.

A settlement is expected to be made within the next ten days and Ohio operators believe that work will be resumed by June 20 at the very latest.

■

Hazards of Coal Mining

Under this head the *Review of Reviews* says, "The coal miner's life at its best is a hazardous one; at its worst, conditions are so hard that men willingly take the chances of war, as they have done in Colorado, in the hope of bettering their lot."

To this, we might append a corollary equally well reasoned. The industry of farming in 1794 proved so dangerous to the Pennsylvania frontiersmen that they left the pursuit of agriculture to bask in the lap of Mars, accounting it safer to face the federal troops than to follow a plow, the point of which might at any time embed itself in a root and injure the husbandman. Agriculture, like mining, is only menacing at times, and the Whiskey Insurrection over, the brave farmers returned to the plow and its dangers.

■

The July 4 issue of COAL AGE will be devoted entirely to coke. All our readers are invited to contribute articles dealing with some phase of coke manufacture. Manuscripts should be in our hands by June 24, or sooner.

The Labor Situation

Progress has been made recently in the signing of several mine scales. On June 4, the representatives of the coal operators and those of the United Mine Workers of America agreed tentatively on a scale to be paid in the Pittsburgh district No. 5 for two years ending Mar. 31, 1916.

The only wage-scale changes have been advances to outside laborers. Dumpers will get \$2.30 per day, rammen \$2.48, bushers \$2.08, trimmers \$2.25 and car cleaners \$2. The wages and conditions, under which blacksmiths, carpenters and rivermen work, are unchanged.

Firemen will hereafter only work eight hours a day, but at the same wages as now paid. Monthly men like teamsters, electricians, stable bosses and engineers are not considered as coming under the new scale.

ELECTRIC-LAMP SCHEDULE

Where lamps now in use are exchanged for the improved electric cap lamp, the miner will be debited 3c. per day. Where open lights are used and the electric lamp is substituted voluntarily, the same charge of 3c. per day is to be made. Safety lamps are to be furnished free of charge when required by the mining law.

This scale has to be presented to a special convention of miners which held its opening session on June 4. The operators' representatives were George Schluederberg, Jesse Sanford, John H. Jones, John Donaldson, William Henderson, William A. Luce and Samuel A. Taylor.

The miners were represented by Van Bittner, president of district No. 5; Robert Wood, a secretary of the central organization; James Flood, Oakdale, Penn.; James Charleton, Fairhaven, Penn.; William Hargest, Monongahela, Penn.; John O'Leary, Roscoe, Penn.; Sidney Davis, Amyville, Penn., and William Tears, Grove City, Penn.

THE KANAWHA STRIKE

The miners of the Charleston district of West Virginia known as No. 17 struck June 1 as soon as the contract with the operators expired. The next day a settlement was secured with some of the operators and 4000 men were enabled to go back to work. It is said that the concessions made were obtained by notifying these operators that their large collateral interest would be boycotted if they did not concede what the union demanded. Up to that time these particular companies had been determined not to concede the matter at issue.

The companies thus making concession were the Paint Creek Collieries Co. with six mines, Mucklow, Wacoma, Banner, Detroit, Greenbrier and Hickory Camp; the Imperial Colliery Co., with three mines at Burnwell, the Standard Splint & Gas Coal Co., with one mine named Standard, the Christian Coal Co. with a mine at Mahan and the National Bituminous Coal & Coke Co., with two mines at Eskdale on Cabin Creek. The Briar Creek and Coal River mines of the Paint Creek Collieries Co. are also included in the arrangement.

THE OPERATORS REFUSE THE CHECK-OFF

There is a possibility that now these important interests have made concession the others will be forced into it. As the contract involves the check-off, the operators forming the Kanawha Coal Operators Association, who will not make the concessions, have written to the President calling his attention to the provisions which are in their opinion a violation of the Sherman law.

In reply Thomas Haggerty, member of the International Board and Thomas Cairns, president of District No. 7 declared that the money collected would not be sent to international headquarters at Indianapolis, but would be used locally. These men declare that the operators in union districts are pleased to continue relations with the U. M. W. of A. or otherwise why do they do business with them year after year. The answer is very plain, the operators have been intimidated by the methods adopted in West Virginia, Colorado and elsewhere and have thought open war less desirable than submission. They are not pleased with the relations existing between the union and themselves. It is a taking piece of irony to ask the operator to admit that he enjoys the relations forced on him by the union.

THE CONCILIATION BOARD

Under Section 8 of the law creating the Department of Labor, Secretary Wilson has appointed a board of conciliation including Charles W. Mills, of Philadelphia, Patrick Gilday, president of United Mine Workers, district No. 2 of Morrisdale Mines, Penn., and O. L. Faulkner, of Cleveland, Ohio. The latter is an employee of the Department of Labor.

The Kanawha Coal Operators Association in a large advertisement in the Charleston "Gazette," June 2, says:

To our employees: Below you will find a copy of the last and final proposition made by the operators at the joint con-

ference which adjourned sine die Thursday, May 28, the representatives of the unions refusing to accept it unless we agreed to the check-off which we declined to do.

A revision of the rules having been agreed to, we now propose in the interest of peace and harmony to agree to your demand for a renewal of the 1912-14 scale of wages for a term of three years. The only other point at issue between us, the check-off, we cannot agree to.

In short, the officers of the United Mine Workers of America propose to call a strike and throw about 12,000 miners out of employment, resulting in a loss of some \$35,000 to \$40,000 a day in wages, suffering and hardship for some 15,000 or 20,000 of their wives and children and paralyzing all business enterprises in Kanawha Valley, for the sole purpose, and no other, of forcing the coal operator to take from each of his employees 50c. or \$1 a month or more and forward it to the officers of the organization at Indianapolis.



Coal Mining Institute of America

The summer session of this institute will be held in the Eagle Hall, at Monongahela, Penn., the town where the institute was organized in 1887. Two days will be taken, Tuesday and Wednesday, the 16th and 17th of June, respectively.

L. C. Isler, mayor of Monongahela, will deliver the address of welcome at 10 a.m., on Tuesday, and S. A. Taylor will then deliver his illustrated address on "The Advancement in Bituminous Coal Mining during the Last Forty Years." In the afternoon a discussion on mine timber will take place. William Lauder will discuss methods of timbering and quality of timber, William Seddon, Brownsville, Penn., the method of timbering with reference to overlying strata and geological formation, and H. I. Smith, who is assistant mining engineer of the U. S. Bureau of Mines, the possible substitutes for mine posts. The evening session is in the hands of the local committee, Henry Loutitt, Alexander McCanch, William Bird, H. T. Booker and W. A. Luce.

The second day session opens at 9 a.m., with a paper on "Accidents Caused by Machine Mining as against Pick Mining," by A. P. Cameron, of Irwin, Penn. This will be followed by the question box conducted by W. E. Fohl. In the afternoon "Practical Results from Efficiency Methods in Mining" will be discussed.

MORE TIME FOR DISCUSSION THAN FOR READING OF PAPERS

It will be seen that a meager program is provided. This is the result of a careful consideration of the best plan to be adopted. It has always been found that the Coal Mining Institute of America meetings have elicited most animated and interesting discussions, which are of as much value as set papers. It has usually been necessary to limit the discussion because of lack of time. It is possible that the shortness of the program will make possible a discussion of more than usual completeness and interest. It is impossible to make a meeting a success where one paper after another is read in a tedious succession and where an enforced *clôture* deadens the personal interest.



Kentucky Mine Owners

Following are the officers and board of directors of the Kentucky Mine Owners Association, whose term of office expires April 1, 1916.

Board of Directors: Frank D. Rash, Earlington; Percy D. Berry, Providence; C. W. Taylor, Greenville; F. M. Sackett, Louisville; K. U. Meguire, Louisville; White L. Moss, Pineville; H. Laviers, Paintsville; J. W. M. Stewart, Ashland; Hywel Davies, Lexington; all of Kentucky, and George T. Watson, Fairmount, W. Va.

Officers: Frank D. Rash, president; Geo. T. Watson and White L. Moss, vice-presidents and W. H. Cunningham, Ashland, Ky., secretary and treasurer.

Sociological Department

The Illinois Miners' and Mechanics' Institutes

By E. C. LEE*

For several years, mining men in Illinois have tried to induce the Department of Mining Engineering of the University of Illinois to establish schools in the mining centers, for the benefit of men who were unable to attend the regular classes of the University. Plans were discussed for some time, but funds were lacking for this form of university extension work. In 1911 the State Legislature passed a bill establishing the Illinois Miners'

TRAINING IS FOR POSITIONS WHICH MUST BE FILLED BY EXAMINATION

Three courses have been adopted for carrying on this work: (1) A two-year course of systematic instruction at mining centers; (2) A short course at the University; and (3) Unit courses in mining towns. The two-year course at the mining centers is so arranged that a man who can give two nights a week for two years can complete the entire course. The subjects he studies are designed to cover all practical details required in the examination by the State Mining Board, from whom a certificate must be received before a man can hold a position



COAL AGE

HARRISBURG SCHOOL OF THE ILLINOIS MINERS' AND MECHANICS' INSTITUTE

and Mechanics' Institutes, and in 1913 an appropriation of \$15,000 per annum was made to carry out the work.

The purpose of these organizations as given in the Act is "to prevent accidents in mines and other industrial plants and to conserve the resources of the state," and any means may be employed "to promote the technical efficiency of all persons working in and about the mines and other industrial plants and to assist them to better overcome the increasing difficulties of mining and other industrial employments."

The Act of 1911 put the control of the Institutes in the trustees of the University, and they were by them placed under the general supervision of the Department of Mining Engineering of the University of Illinois, of which H. H. Stoek is the head. The work is in charge of a director, and R. Y. Williams, late of the United States Bureau of Mines, was selected for this position, with headquarters at Urbana.

as state inspector of mines, mine manager, mine inspector or hoisting engineer.

Schools for this two-year course have been opened in Belleville and Collinsville, under W. L. Morgan, ex-state inspector of mines; and in Harrisburg and Herrin, under E. C. Lee, mining engineer. The high schools in these cities are coöperating with the institutes, furnishing room, light, heat and janitor service. In addition to this, a member of the high-school faculty acts as an assistant instructor, making any physical and chemical demonstrations necessary to illustrate the points brought out in the lecture by the instructor.

The physical and chemical laboratories of the high schools are at the service of the Institutes, and the apparatus in these laboratories is supplemented by apparatus kept in the office at Urbana, subject to the call of the instructors. Stereopticon work is used largely in addition to the physical and chemical demonstrations. In the study of safety lamps, for instance, not only is the lamp in question shown to the class, but assembled ready

*Mining engineer and instructor, Illinois Miners' and Mechanics' Institutes.

for use and taken apart so as to show the different parts, and sectional views of the lamps are shown on the screen at the same time.

SUBJECTS TAUGHT AND TIME DEVOTED TO THEM

In the two-year course, the subjects are arranged in groups, 8 weeks or 16 nights being allowed for each group. The list of subjects and the time devoted to each are as follows:

PROSPECTUS OF STUDIES			
Group	Course	Subject	Sessions
A	1	Methods of mining.....	10
	2	Timbering	5
B	3	Ventilation	8
	4	Mine gases and safety lamps.....	5
	5	Special underground rooms.....	2
C	6	Geology	5
	7	Surveying	10
D	8	Coal, a fuel.....	5
	9	Surface plant	5
	10	Steam	5
E	11	Hoisting	7
	12	Haulage	8
F	13	Fire protection	5
	14	Electricity	10
G	15	Drainage	6
	16	Explosives	9
		Review	7
		Total	112

Each subject is considered with reference to safety, efficiency, conservation and the state mining law; and in each subject the points covered are mining practices, mathematics, sciences and English, with sketches illustrating the apparatus used.

The courses are not necessarily studied in the order given in the schedule, the men being allowed to choose, by a majority vote, the next subject to be covered. The only restriction made is that each group must be taken up before the work in any one group is covered for the second time. Men may enroll for any course desired, receiving credit for the courses completed. A copy of the enrollment card is shown, the front to be filled in by the student, and the back for the records of the instructor.

ILLINOIS MINERS' & MECHANICS' INSTITUTES

School	Date	
Name	Age	Married
Occupation	Company	
Previous education		

Certificates received	Desired
-----------------------	---------

Remarks

FRONT OF CARD			
Group Study	Attendance	Grade	Remarks
A			
B			
C			
D			
E			
F			
G			

BACK OF CARD

WILL TRY AND REACH FOREIGNERS

Recognizing the fact that many of the miners are of foreign birth, and unfamiliar with the English language,

it is planned to establish classes for the men speaking a foreign language, to be taught by a man familiar with their own tongue. In these classes, if possible, a mining man will be selected as instructor, so that the work in English, mathematics and mining may go on at the same time.

The same work is covered in the short course at the University as is taken up in the two-year course in the field, 6 weeks' time being spent in the work. In this course, 4 hours each morning are spent in lectures and discussions conducted by the teaching staff of the University and of the institutes. During 3 hours each afternoon, courses are given in the mining and safety-lamp laboratories, in surveying on the campus, in drawing, and in rescue and first-aid work at the University mine-rescue station. The schedule for the short course for this spring is as follows, men being allowed to enter for any group of subjects or for the entire course:

THE SHORT COURSE AT THE UNIVERSITY OF ILLINOIS

Dates	Subjects for Discussion*	
	Morning Sessions 8 a.m. to 12	Laboratory and Field Work Noon Afternoon Sessions 2-5 p.m.
April 6-11.....	Geology Methods of mining	First aid training Drawing
April 13-18.....	Timbering Coal, fuel Surface plant	First aid training Drawing
April 20-25.....	Steam Hoisting Haulage	Mine rescue chamber Mining laboratory
April 27-May 2.....	Fire protection Ventilation Surveying	Mine rescue chamber Mining laboratory
May 4-9.....	Special underground rooms Electricity Mine gases and safety lamps	Surveying on the campus Safety lamp laboratory
May 11-16.....	Surveying Electricity Explosives Drainage	Surveying on the campus Safety lamp laboratory

*For details of the topics covered under each subject, see schedule for the two-year course.

THE UNIT COURSE

A unit course is the term applied to one where a single subject is taught at a time, and where a considerable interval is allowed to lapse before another unit is taken up. In the conduct of these unit courses, an instructor is placed in a district where eight towns will arrange to furnish classes of fifteen or more men. Once in every three months the instructor will visit each town in the circuit and give a two-week unit course, which will consist of two hours' work on four evenings each week.

In the conduct of the different courses, the Institutes will coöperate with the State Mining Board and inspectors, the Illinois Mine Rescue Commission, Miners' Locals, the United States Bureau of Mines, the public schools, and with first-aid and other local organizations. It is planned later, when funds are available, to offer correspondence courses for men who cannot attend the regular classes, to print the lectures which are given in the two-year course, and make them the basis on which the correspondence course will be treated.

Firedamp Ignited by Sparks from an Electric Bell

In South Wales a fatal accident has been traced to an ignition of firedamp by sparks from an electric bell in use for signaling purposes. The electric bell was an ordinary one of the trembler pattern worked by an induction coil and a battery of eight Leclanche cells. Tested after the accident, the battery gave 11½ volts. It was proved experimentally that sparks from the bell, when supplied with current from the same battery, would ignite an explosive mixture of coal gas and air, and this latter was subsequently fired by sparks caused by rubbing a file across two wires connected to a pair of cells, giving only 4 volts pressure.

Discussion By Readers

Checking System for Miners' Coal

Letter No. 1—We were much interested in reading the excellent letter by Erskine Ramsay, of Birmingham, Ala., COAL AGE, May 23, p. 862, entitled "A Checking System for Coal Loaded by Miners," and since you have asked for views along this line, I send you herewith a sketch and description of a plan we have formulated for accomplishing very much the same purpose.

The accompanying illustration shows the conventional headframe and weigh-hopper, arranged for self-dumping cages. This design was adopted to meet the requirements stated by Mr. Ramsay, since it was necessary, for various reasons, to determine the exact amount of impurities that may be loaded by a miner, and the following description will explain the way in which we met this condition.

The self-dumping cage, with its weigh-hopper presents no new features. The weigh-hopper is designed to dis-

interval on the screen, between consecutive dumps. This interval, though small, is perceptible. Under the outer end of the refuse trough *B* is a small weigh-hopper, arranged with a gate at the bottom which may be opened or closed by men standing at the picking table. The weighman and check weighman, instead of being in the weigh-house, as customary, stand on the screen floor near the picking table.

The operation is as follows: The coal is dumped, weighed, screened and picked, the weighman recording the weight in the usual manner and the picker simply throwing the rock into the rock conveyor, which carries it forward and dumps it through the weigh-hopper at the outer end, which is ordinarily open. But, whenever a car of coal appears to contain an unusual amount of dirt, the man in charge of the picking floor closes the gate in the rock weigh-hopper and watches the dial attached to this scale until all of the pickings from this car are in the scale hopper. He then instantly reports this weight

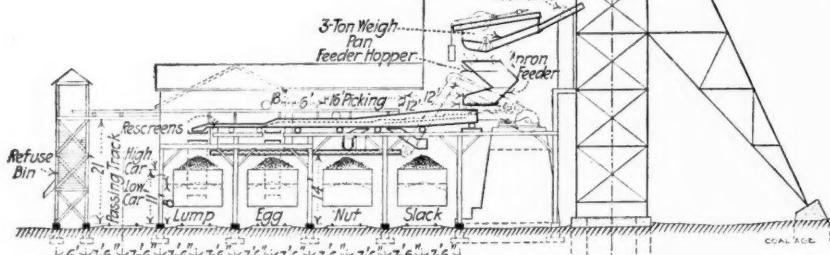
of rock to the weighman who records it opposite the weight of the coal in the same car. Should conditions justify it, the exact amount of pickings could be determined and recorded for every car of coal dumped.

We recognize, however, that there is one thing this device will not do. It will not determine the amount of dirt there may be in the fine coal below the $1\frac{1}{2}$ in., but it *will* absolutely locate the man who is loading dirty coal.

It should be stated that the weight of rock obtained in the rock-weighing process may be indicated by means of a dial, at the weighman's desk, so that, with the miner's check in his hand, he

can record the weight of material in the pit car, and immediately thereafter the weight of material picked out.

JOHN V. SCHAEFER, Vice-Pres.,
Chicago, Ill.
Roberts & Schaefer Co.



PROPOSED ARRANGEMENT OF CHUTES, SCREENS, PICKING TABLES AND WEIGH-HOPPERS TO CHECK MINERS' COAL

charge into a feeder-hopper, made large enough to have twice the capacity of a pit car. This feeder-hopper is closed at the bottom by means of a device that feeds the coal out of the hopper in a steady stream and would entirely empty the hopper if permitted to do so. From this hopper the coal is discharged onto a Marcus patent picking-table screen.

The illustration shows the location and size of the screen; which affords 16 ft. of picking space. The 12-ft. screen marked "nut" is provided with $1\frac{1}{2}$ -in. round holes, and this perforated plate permits all the small sizes below $1\frac{1}{2}$ in. to pass through to the lower decks so that the 16-ft. picking table, which is unperforated, has upon it only such coal as is above $1\frac{1}{2}$ in. in size. The pickings are thrown into a rock carrier, marked "*B*," which is a chute attached to the Marcus screen, and shaking with it. By this carrier, all the pickings are carried forward to the refuse bin shown in the illustration.

The capacities of the feeder and of the screen are such that the coal can be dumped and screened at a rate equal to the full capacity of the mine, and yet permit of a small

Letter No. 2—I have read with interest Mr. Ramsay's letter on a Checking System for Coal Loaded by Miners, COAL AGE, May 23, p. 862.

A few months ago, I replaced a docking system in use at the mines of the LaFollette Coal, Iron & Ry. Co., with the following system, which has resulted in an improvement of 100 per cent. in the cleanliness of the coal.

A mine foreman should visit every working place in the mine, at least once each day the mine is running, but to do so, in our mines, would be a physical impossibility, owing to the extent of the area mined. To insure a personal visit to each working place, therefore, assistant mine foremen are employed. With this addition, the mine foreman or one of his assistants is able to see each miner at least once every day.

On the tipple, a coal inspector was placed, whose duty is to inspect every mine car as it comes from the mine, which he does without stopping the car. He carries a small two-pronged rake or hoe, with which he digs into the car at different points. He sometimes varies his method by following each car to the dump and watching the coal as it is dumped onto the screens. The cars come to the tipple in trips of 15, with the miner's check number on the outside of each car.

When the inspector finds a dirty car he makes a note of the number of the car in a book, which he carries for that purpose. At the end of the day a list of the numbers of miners loading dirty coal is handed to the mine foreman, who visits these men the next morning, and judges for himself if it is possible for the miner to load clean coal where he is working. If this is not possible, he may change the miner to a place where it is possible to load clean coal. If, however, in the foreman's opinion, the miner can load clean coal from his working place, a heart-to-heart talk takes place. If the miner shows a disposition to do better and not to repeat the offense, he is given another trial. If, however, his subsequent loading proves he is careless or don't care, he is given an order for his money. In the last three months, not more than six miners have been discharged for loading dirty coal.

About 50 per cent. of our coal is made into coke, the balance being disposed of as domestic coal. A much better coke has been the result, and little or no complaint is now being registered against the domestic grades.

A reduction in accidents has also been noted, as much better inspection is obtained. A gain in tonnage has also resulted with a resulting reduction in the cost of production.

G. M. SHOEMAKER, Manager of Operations,
La Follette Coal, Iron & Ry. Co.
La Follette, Tenn.

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Calculation of Coal-Washing Efficiencies

In a recent article on this subject, COAL AGE, May 2, p. 723, G. R. Delamater has attempted to express, by formula, the efficiency of any coal-washing machine or plant, hoping by this means to furnish a standard of comparison of the results produced in the use of different machines for washing coal.

As far as the formulas are concerned, they give valuable indications of the work each machine is doing when the several data involved are considered separately and with due regard to the required market conditions. The attempt, however, to combine the data relating to the percentage of washed coal produced and ash content, by taking the arithmetical means of two different efficiencies and calling this the washing efficiency, is not clear. It is not apparent why these formulas should be combined at all; or why they should be combined by taking the arithmetical mean, rather than by multiplying the results together or by any other method that could be applied. What these combined results represent, it is difficult to say; and it would be interesting to know whether Mr. Delamater has any logical reason for taking the arithmetical mean, instead of the product of the two efficiencies already determined.

As a matter of fact, it would seem that the attempt to combine, in this manner, the efficiencies of two machines

working under different conditions, is an impossible task. On the other hand, if a method could be evolved that would express the commercial efficiency of a coal-washing machine under particular conditions, and that would enable a comparison of the work performed by that machine with that performed by another machine operated under the same or other specified conditions, there can be no doubt but that such method would have more value than this will-o-the-wisp, which Mr. Delamater has here presented.

Commercial efficiency, in coal washing, will depend very largely on the market conditions and requirements. Suppose, for example, we have a coal whose standard percentage for washed coal is rated at 95 per cent., with an allowable ash content of 5 per cent.; and suppose this coal, treated in two jigs of different type, gives the following results:

Jig 1, washed coal, 85 per cent.; ash content, 5 per cent.
Jig 2, washed coal, 80 per cent.; ash content, 3 per cent.

From these figures it is desired to ascertain which type of machine should be used to wash this coal. In both machines, the percentage of washed coal is below the standard, and, while the percentage of ash is standard in jig No. 1, it is below the standard in jig No. 2. Therefore, the efficiency of jig No. 1 must be calculated by formula D (p. 727), as the results obtained correspond to the third condition. The efficiency for jig No. 2, however, must be calculated by formula E, as the results here obtained correspond to the fourth condition given by Mr. Delamater on p. 726. The efficiencies as calculated by these formulas are as follows:

$$\text{Jig No. 1, effy.} = \frac{1 + 85/95}{2} \times 100 = 94.74\%$$

$$\text{Jig No. 2, effy.} = \frac{3/5 + 80/90}{2} \times 100 = 72.10\%$$

Regardless of these results, it is quite clear, from a commercial point of view, that, unless there is any pecuniary advantage in obtaining an ash content lower than the standard, 5 per cent., jig No. 1 is the machine to use, since this produces the largest per cent. of washed coal. But, to illustrate, suppose that the market price of the washed coal is x dollars per ton of coal; and that there is a bonus of a dollars per ton, for each per cent. that the ash falls below the standard 5 per cent. Then, the relative values of the products of these two jigs are as follows:

$$\text{Jig No. 1, } \frac{85}{95}x + (5 - 5)a = 0.8947x$$

$$\text{Jig No. 2, } \frac{80}{95}x + (5 - 3)a = 0.8721x + 2a$$

Aside from the relative first cost, cost of upkeep and depreciation, the relative commercial efficiencies of these two jigs is determined by equating the above values. Thus,

$$0.8947x = 0.8721x + 2a$$

$$a = \frac{(0.8947 - 0.8721)x}{2} = 0.0113x$$

From the above, it is evident that if there is no bonus or $a = 0$, No. 1 jig is the most efficient commercially.

But, when there is a bonus granted for each decrease of 1 per cent. in ash, No. 2 jig will be commercially more efficient when the bonus (a) is greater than $0.0113x$; or, assuming the market price of washed coal (x) is \$5, if a is greater than $0.0113 \times 5 = \$0.065$, or $6\frac{1}{2}\text{c}$. per ton. This method of comparing the commercial efficiencies of

different machines was evolved after a study of Mr. Delamater's article. It is possible that numerous faults and fallacies may be pointed out by other readers of COAL AGE, but if it stimulates further thought on the subject, as Mr. Delamater's article has already done, it will serve a useful purpose.

J. B. DE HART.

Coleman, Alta., Canada.

The Air Factor in Mine Explosions

John Verner has favored us again, COAL AGE, May 16, p. 818, with another letter in which he attempts to further explain his idea of the "reverse impulse" assisting the propagation of a mine explosion. I fail to see that he has made himself any clearer than at previous times. Being desirous of obtaining a clear conception of Mr. Verner's meaning, I would ask him to kindly illustrate his ideas, if possible, by a few hand sketches or diagrams; and state if what he calls the "reverse influence" is the same as what is generally spoken of as "back suction." It is quite commonly assumed that the expressions, "back suction," "vacuum stage"

and "back lash," in reference to an explosion, are synonymous terms. These all relate to a reaction that sets in immediately after the explosive wave has passed. If, then, what Mr. Verner styles "reverse influence" refers to a similar reaction following the explosion, I would ask, how could that affect, in any way, the original explosion. Mr. Verner adds:

It may be properly assumed that the vastly more powerful air blast, traveling in opposition to the explosion flame, must be an important, if not the controlling factor, in propagating explosive combustion.

As no one will probably deny this statement, it follows that what Mr. Verner designates as the "controlling factor" is the air current traveling in its original direction, assuming the explosive wave advances against the intake air. This condition was shown in Experiment No. 13 of the Altofts series, by a resulting 4-lb. vacuum. Mr. Verner also refers to Experiment No. 21 of the same series, where an explosion occurred within an explosion, as shown by the published photographs at the time. He refers to this double explosion as an evidence of the "reverse influence," but does not say where this reverse took place; nor does he make clear on what ground he bases such a conclusion.

JAMES ASHWORTH, Mining Engineer.
Vancouver, B. C., Canada.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

SYMBOLS AND FORMULAS

Most of the rules of mine ventilation are expressed by means of formulas, which show at a glance the relation of the several factors to each other, and make possible many transformations and developments.

Symbols—As far as practicable, the same symbols are used throughout to designate the same factors; and these are, for the most part, those symbols commonly employed in ventilation, as being the initial letter of the word for which they stand. For example, p = pressure; v = velocity; q = quantity, etc. The following table gives the more important symbols used:

TABLE OF COMMON SYMBOLS, MINE VENTILATION

A = area of regulator,	Q = total circulation of air, cu. ft. per min.
a = area of airway,	q = single current, cu. ft. per min.
B = height of barometer,	r = resistance of mine or airway, lb.
C = Centigrade reading,	deg. r = any ratio, ...
c = constant,	s = rubbing surface of airway, sq. ft.
D = depth of shaft,	T = absolute or higher temperature, deg.
d = diam. or side of airway,	t = lower temperature, deg.
F = Fahrenheit reading,	U = total power on air, ft.-lb. per min.
g = gravity,	u = power, single current, ft.-lb. per min.
H = horsepower on air,	v = velocity of air, ft. per min.
h = height of air column,	V = volume of air or gas, cu. ft.
K = Efficiency of fan,	W = total weight of body, lb.
k = coefficient of friction	w = unit weight, lb. per cu. ft.
l = length of airway,	X = potential of mine or airway, ...
n = number of revolutions,	x = the unknown quantity whose value
o = perimeter of airway,	is sought.
P = total pressure,	$w.g.$ = water gage reading, in.
p = unit pressure,	$Sp.gr.$ = specific gravity, ...

Small subscript letters and figures are frequently written immediately after any symbol to show its reference to a particular kind or thing. For example, q_A , q_B , q_S , etc., indicate the quantities of air passing in three or more airways; q_{A_1} , q_{B_1} , q_{S_1} , etc., indicate the quantities passing in Splits A, B, C, etc. In like manner, the potential values of different airways and splits are indicated by X_A , X_B , X_S , etc.; or X_A , X_B , X_C , etc., as the case may be.

In some cases, two or more subscript letters or figures are used after a single symbol to indicate its reference; as for example, the pressure potential for Split A is written X_{pa} , or the power potential X_{pa} . The general potential, in a split circulation, is written X_o ; or X_p and X_{pa} to indicate the general pressure and power potentials, respectively.

It is often necessary to indicate the summation of a number of items of the same kind, for which purpose the character Σ is written before the symbol indicating the kind. For example, ΣX_{abc} indicates the sum of the potential values for the splits A, B and C, instead of writing $X_A + X_B + X_C$.

In a complex circulation, consisting of a main airway and two or more splits, it is often necessary to indicate the general split potential by X_{wo} and the mine potential by X_{po} .

The Coal Age Pocket Book

Use of Formulas—A few formulas comparatively form the basis from which practically all the other formulas of mine ventilation are derived. These few basal formulas also show the true relation, one to the other, of the several factors of ventilation, such as pressure, velocity, quantity, power, rubbing surface and the sectional area of mine airways.

The understanding of these formulas makes it unnecessary to learn and remember a large number of rules of ventilation. A formula is written as an algebraic equation in which each factor is expressed by its proper symbol. The equation shows the equality of certain factors grouped in the form of an expression. For example, the formula

$$pa = ksv^2$$

shows the equality of the total ventilating pressure pa and the resistance of the airway when the rubbing surface is s and the velocity of the air current v .

How Factors Vary—It is evident, from the inspection of a formula, that:

1. Any factor in one member of the equation varies directly as any factor in the other member, provided all the other factors remain constant and none of the quantities expressed in the formula are connected by the signs plus (+) or minus (-).

2. Any factor in either member varies inversely as any other factor in the same member, provided and except as stated (1) above.

For example, the above formula shows that:

The total ventilating pressure (pa) for airways varies as the resistance (ksv^2) of the airway.

For any given airway, a , s and k being constant, the unit pressure (p) varies directly as the square of the velocity (v^2) of the air current.

For the same total pressure (pa), in an airway, k being constant, the square of the velocity (v^2) varies inversely as the rubbing surface (s). Or, in other words, the velocity (v) of the air current varies inversely as the square root of the rubbing surface (\sqrt{s}).

For the same velocity (v) of air and the same rubbing surface (s) in an airway, k being constant, the unit pressure (p) always varies inversely as the sectional area (a) of the airway.

Transposing the above formula for total pressure, the formula for unit pressure producing a given velocity in a given airway or mine is

$$p = \frac{ksv^2}{a}$$

An inspection of this formula shows that:

3. The other factors remaining constant and none of the quantities being connected by the signs plus (+) or minus (-), any factor in the denominator of a fractional term forming either member of the equation varies directly as any factor in the numerator of that fraction; and inversely as any factor in the other number.

Inquiries of General Interest

An Oil-Well Problem

I am writing COAL AGE for a little information, in order to settle an argument that has arisen over the sinking of an oil well in this community. The sinkers claim that there is oil in this hole, but that it will not rise to the top because there is too much water in the hole. The well is 8 in. in diameter and 1300 ft. deep.

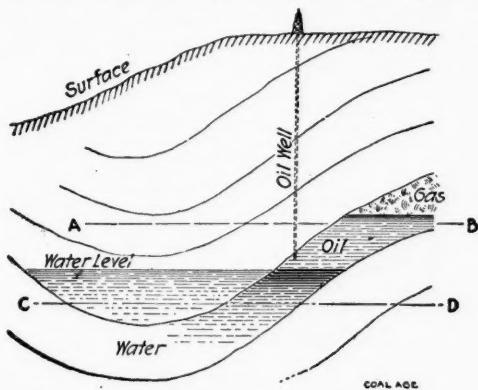
It is argued by some that if this hole was filled with water to the top and there was any oil in the hole, it would rise to the surface of the water. Others claim that the oil will not rise to the surface owing to the great pressure of the water in the hole, which they estimate as being 14 tons. Any information you can give that will throw light on the real condition existing in the hole will be greatly appreciated.

A SUBSCRIBER.

Gilmour, Ind.

It is a well known fact that oil will float on the surface of the water, because its density is less than that of water. This being a hole of large diameter, if there was oil in the hole, it would certainly rise to the surface of the water.

However, the presence of water standing in the hole points to the fact that the water level in these measures



IDEAL CROSS-SECTION OF OIL- AND WATER-BEARING MEASURES

has risen above the bottom of the hole. As shown in the accompanying sketch, suppose that the well has penetrated the productive measures at a point above the indicated water level. In this case, there is nothing to prevent the oil from entering and rising in the hole to a height only determined by the pressure in the measures.

This pressure is frequently so great that the oil is thrown out of the hole in a vertical stream that may reach a height of 50 ft. or more. Such wells are known as "spouting wells." In other cases, it is necessary to pump the oil from the hole into which it drains from the surrounding strata.

In time of a freshet or during a wet season, however, the water level may rise to the line AB; while, during a drought or dry season, it may fall to the line CD. As the water level rises, in this manner, the oil is forced to a

higher level in the measures and is then unable to reach the hole. This produces the condition that is generally known in oil sections as "drowning out" the well. It is possible that this condition may exist, at the present time, in the hole mentioned.

Working Coal Seam with Heavy Parting

Kindly submit the following question to the readers of COAL AGE for discussion:

Would it be practicable or profitable to work a 5-ft. seam of coal that has a parting in the center varying from 6 to 18 in. in thickness? The material forming this parting is hard and shoots with the coal; it can, however, be easily drilled and mined with the pick. Both the roof and bottom of the seam are exceptionally good and a minimum amount of timbering is, therefore, required.

This deposit is located in the northwestern corner of Missouri, in close proximity to good markets, the quality of the coal being superior to that of 75 per cent. of the coal mined in Iowa. Following is a proximate analysis of the coal:

	Per Cent.
Moisture	4.86
Volatile combustible matter	39.48
Fixed carbon	51.12
Ash	4.54
Total	100.00

The coal contains 3.73 per cent. of sulphur, and its calorific value is 13,187 B.t.u.

The mining of this coal presents a proposition of two contiguous seams, each 2½ ft. in thickness, separated by a considerable parting of refuse material. The handling and disposition of this waste material will determine largely the cost of production. I shall much appreciate the suggestions of readers who have had experience in dealing with similar propositions.

FREP MORCK.

Warren, Penn.

This is an excellent question for discussion and should bring forth a number of practical suggestions in regard to the most economical method of mining to adopt. No doubt some will advise the longwall method of mining, as there is plenty of waste material for building the packs. Some, on the other hand, may prefer to drive wide openings and build the waste at the side of the roads, which has the advantage of avoiding the expense of yardage for entry driving, the same as in longwall.

It may be stated that the coal measures, in the section in which this mine is located, are generally favorable to longwall work; but this does not mean to imply necessarily that the longwall method of mining would prove the most economical method to adopt. The question of whether the mining should be done in the parting or in the floor is an important one. Let there be a free and practical discussion.

Examination Questions

Anthracite Mine Foremen's and Assistant Mine Foremen's Examination Held at Pottsville, Penn., May 25, 26, 1914

(Continued from last issue)

Ques. 8—Suppose a mine has two openings, one 60 ft. higher in elevation than the other, on the surface; the temperature of the air outside being 85 deg. and that inside of the mine 50 deg., would there be a current of air passing in the mine; and, if so, in what direction?

Ans.—In this case, much would depend on the depth of the two shafts and the inclination of the seam. The surface elevation at one shaft being 60 ft. above that at the other, suggests the possible formation of a cooler and therefore heavier air column in the shaft having the higher elevation at the surface, assuming that the shaft has a temperature equal to that of the mine (50 deg.), which would make this shaft the downcast. In case the shafts were not deep, this condition would probably prevail, to a greater or less extent, and create a permanent circulation of air in the mine.

In case the shafts were deep, however, or the seam had a considerable inclination, the warm outside air entering the downcast shaft would soon raise its temperature, with the result that there would be little or no perceptible current passing in the mine. What little air would circulate under these natural conditions would simply serve to equalize the temperature of the two air columns.

Ques. 9—When a fan is exhausting the air from a mine, how does it produce ventilation? State, also, how a forcing fan produces ventilation.

Ans.—The action of the fan is the same in either case, the system of ventilation depending simply upon the connection of the mine with the fan.

The action of a centrifugal fan is to create a depression at or near the center of the fan and a compression at the circumference. Under the pressure of the atmosphere, air enters the center of the fan and passes thence to the circumference, where it is discharged, owing to the centrifugal force created by the revolution of the air within the fan.

When the central opening of the fan is in connection with the fan drift, air is exhausted from the mine, and passing through the fan is discharged from its circumference into the chimney and thence into the atmosphere. When the fan is forcing air into the mine, the discharge from the circumference of the fan is conducted into the fan drift, the center of the fan being open to the entrance of the outside air.

In the exhaust system of ventilation, the atmospheric pressure acting on the downcast shaft or intake opening of the mine, forces the air through the mine against the depression in the fan drift due to the action of the fan. The mine airways, in this case, correspond to the suction pipe of a pump or a siphon.

Ques. 10—What are the provisions of the law regarding doors in mines?

Ans.—The anthracite mine law (Art. 10) requires (Sec. 9) all main doors to have an attendant to open and close the door for the passage of cars or men and prevent their standing open; (Sec. 11) all main doors to be so placed that one is always closed when the other is open, thereby preventing any break in the air current; and (Sec. 12) an emergency door provided at all main points and kept standing open so that it will not be destroyed by accident, but can be used at once in case the regular door is broken or destroyed by an accident. The framework of main doors (Sec. 13) must be substantially secured in stone or brick laid in mortar or cement, unless permission to the contrary is given by the inspector in writing.

Ques. 11—What material, in your judgment, should be kept on hand at fiery or gaseous mines, to meet emergencies that are likely to arise from explosions of firedamp?

Ans.—At such mines there should be provided a duplicate or emergency fan that could be at once placed in commission, in case the regular fan was disabled or in case a larger circulation of air should be required to clear the mine. There should always be kept on hand a plentiful stock of timbers of the required size, cap-pieces, brattice boards and canvas, nails and tools. There should be provided, also, a plentiful supply of approved safety lamps and these should be kept in condition ready for immediate use. There should also be a fully equipped rescue station, supplied with a reliable type of breathing apparatus, pulmometers, oxygen cylinders, etc., and a well trained rescue corps. The equipment of the rescue station should include either birds or mice that can be taken into the mine in small cages by the rescue party.

Ques. 12—What dangers are probable in a mine after an explosion of firedamp, and what precautions should be taken upon entering the mine?

Ans.—The chief danger is the presence of the after-damp of the explosion. There may also exist dangerous quantities of explosive gas that may, at any moment, give rise to a second explosion of even greater violence than the first. There is danger, moreover, of heavy roof falls that renders the work of entering the mine extremely hazardous. Only experienced men should be allowed to undertake the work of rescue, and these must be equipped with the necessary breathing appliances to enable them to proceed with caution to examine, in turn, each section of the mine, in advance of restoring the full circulation of air in such sections. The purpose of this first investigation is to ascertain the condition of the air passages and workings, and to discover, if possible, any survivors of the explosion. In this work, only safety lamps or well protected electric lamps should be used. If fire is discovered in the workings, efforts should be made to extinguish it at once. The investigation should proceed, in this manner, until every section of the mine has been explored. As the air current is restored in each section, other rescuers and workmen can enter to aid in the work.

Coal and Coke News

Washington, D. C.

In view of the early completion of the discussion on anti-trust legislation in the House of Representatives, that having been closed on Friday, June 5, a strong demand has arisen in the lower chamber for the adoption of a compulsory party programme designed for the adoption of the so called "Conservation bills" all of which have been before Congress in one form or another for a good while past. Included in this programme are the radium bill which provides for government monopolization and control of radium bearing ores, the Alaska coal land leasing bill, the general oil land leasing bill, and the water power and public land bill.

It is not yet certain how the effort to secure action on these bills at the current session will turn out, but up to date about 200 members have agreed to sign a petition to the Rules Committee asking for the preparation of a binding rule which shall insure the pressing forward of this general scheme of legislation.

Secretary Lane and Chairman Henry of the Rules Committee recently had a lengthy conference with President Wilson in regard to this whole matter and it is understood that the President expressed strong interest in the conservation measures although he did not undertake to commit himself to them as a necessary part of the administration scheme of legislation for the year. If the bills can be passed in the House before adjournment, it will be regarded by the advocates of the scheme as a decided victory in behalf of their ideas.

No Coal Freight Advance Is Expected

It is understood that the Interstate Commerce Commission is now definitely in position to hand down a decision in the 5 per cent. advance rate case within a comparatively short time and that in any event a decision may be expected before the end of June. Extreme secrecy has been observed by members with reference to the nature and scope of the report they intend to make. From inquiries that have been made, however, and from the general tone of affairs at the offices of the Commission, it is pretty generally understood that there is no intention of advancing the rate upon any class of coal.

Anthracite coal is already regarded as bearing altogether too high a freight rate while with reference to bituminous coal, it is felt that the operators have made out a case for their contention that if they were compelled to pay more for freight rates the mines in a good many of the fields could hardly continue doing business if they were to pay expenses.

Another factor which contributes strongly to the belief that the Commission will not sanction any advance in freight rates is the circumstance that according to general opinion Mr. Brandeis, the Commission's counsel, has not succeeded in restraining the members from determining to make some advances. This practically implies as a corollary that concessions will be made to Mr. Brandeis along other lines and that some of the items in which he has been most earnest to prevent advances will be dealt with as he desired. One of the things in which he has been most interested is bituminous coal.

On June 8 representatives of Ohio bituminous coal operators filed application in the United States Supreme Court for an injunction against the enforcement of the Ohio State Anti-Screen law until its legality can be tested. The matter was presented by A. C. Dustin, who appeared as counsel for the operators of Cleveland. The matter was taken under advisement.

Appropriations for the Bureau of Mines

The Sundry Civil Appropriation Bill which has just passed the House of Representatives contains important appropriations for the Bureau of Mines, which are expected to be retained substantially unchanged by the Senate as follows:

For general expenses, including pay of the director and necessary assistants, clerks, and other employees in the office at Washington, D. C., and in the field, and every other expense requisite for and incident to the general work of the bureau in Washington, and in the field, to be expended under the direction of the Secretary of the Interior, \$70,000.

For investigation as to the causes of mine explosions, methods of mining, especially in relation to the safety of miners, the appliances best adapted to prevent accidents, the possible improvement of conditions under which mining operations are carried on, the use of explosives and electricity, the prevention of accidents, and other inquiries and technologic investigations pertinent to the mining industry, \$347,000;

For purchase of mine-rescue, first-aid and fire-fighting equipment and supplies for use in the operation of mine-rescue cars and stations, \$30,000;

For purchase of steam and electric equipment for supplying light and power to the testing plant of the Bureau of Mines at Pittsburgh, Penn., \$10,000.

For investigation of mineral fuels and unfinished mineral products belonging to or for the use of the United States, with a view to their most efficient mining, preparation, treatment and use, including personal services in the bureau at Washington, D. C., not in excess of the number and total compensation of those so employed during the fiscal year 1913, \$135,000;

For inquiries and scientific and technologic investigations concerning the mining, preparation, treatment, and utilization of ores and other mineral substances, with a view to improving health conditions and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries: Provided, that no part thereof may be used for investigation in behalf of any private party, nor shall any part thereof be used for work authorized or required by law to be done by any other branch of the public service, \$100,000.

For inquiries and investigations concerning the "mining," preparation, treatment, and utilization of petroleum and natural gas, with a view to economic development, and conserving resources through the prevention of waste; to inquire into the economic conditions affecting the industry, \$25,000;

For one mine inspector for duty in Alaska, \$3000;

For per diem, subject to such rules and regulations as the Secretary of the Interior may prescribe, in lieu of subsistence at a rate not exceeding \$5 per day when absent on official business from his designated headquarters, and for actual necessary traveling expenses of said inspector, \$2500;

For technical and scientific books and publications and books of reference, including payment in advance for subscriptions to publications, \$1500;

For purchase or lease of the necessary land, where and under such conditions as the Secretary of the Interior may direct, for the headquarters of five mine rescue cars and for the construction of the necessary railway sidings on the same, \$1000; Provided, that the Secretary of the Interior is authorized to accept any suitable land or lands that may be donated for said purpose;

In all, for the Bureau of Mines, \$725,000.

Persons employed during the fiscal year 1915 in field work, outside of the District of Columbia, under the Bureau of Mines, may be detailed temporarily for service at Washington, D. C., for purposes only of consultation or in connection with the preparation of results of their field work; all persons so detailed shall be paid in addition to their regular compensation only their actual traveling expenses in going to and returning therefrom; and all details made hereunder, and the purposes of each, during the fiscal year shall be reported, in the annual estimates of appropriations, to the Sixty-fourth Congress at its first regular session.

HARRISBURG, PENN.

The final arguments in the Government suit against the Reading Co., the Philadelphia & Reading Coal & Iron Co., the Philadelphia & Reading Railway Co., endeavoring to dissolve the so called anthracite coal trust which is alleged by the Government to exist as the result of an illegal combination between these companies, were begun on June 3, in the United States District Court of Pennsylvania.

G. Carrol Todd, special assistant United States District Attorney, made the opening plea for the Government, contending that the Reading Co. is a combination in restraint of trade, due to the fact that it owns stock in both the Reading railway company and the Philadelphia & Reading Coal & Iron Co. The Government also contends that this stock is juggled regardlessly and that large sums of money are lent from one company to the other without interest.

Mr. Todd first gave a general outline of the history of the case and cited the former suit against the same defendants which resulted in the court order to dissolve the Temple Iron Co. In explaining the relationship between the Reading Co. and its affiliated companies he declared that the Reading Co., with the Central R.R. of New Jersey, the Lehigh & Wilkes-Barre Coal Co., and the Lehigh Coal & Navigation Co., controlled 63 per cent. of the unmined coal in the Schuylkill region and furnished 29 per cent. of the entire hard-coal output.

In speaking of the alleged combination he explained that such a method was not the natural and normal way for a

railroad to grow. "The natural and normal way for it to grow," said he, "is by acquiring connecting lines and not those in competition. In every state in the Union it is unlawful for a railroad to acquire competing lines. These combinations, however, cannot be effectually dissolved by a distribution of stock."

While discussing the financial relations existing between the old Reading R.R. and the present Reading Ry. with the Reading Coal & Iron Co., Mr. Todd said that the railroad had lent immense sums to the coal company. He said that at the time of reorganization the total indebtedness of the coal company to the old railroad was \$68,000,000.

Immediately after the reorganization we have the pro-posterously absurd situation of the company transferring a debt of itself, to itself, through the Reading Co. Since the reorganization the Reading railway company has made additional advances to the coal company of \$12,000,000. These loans are supposed to be secured by general mortgages, but the Reading Co. pays the interest on the bonds and the coal company has never made a payment on them. Thus, we have a total unsecured debt of about \$80,000,000 carried on the books as an open account. A sum approximating \$12,000,000 in interest has been remitted to the coal company by the railroad company. In view of these facts, is it any wonder that the Reading Co. owns most of the coal business in the Schuylkill region? It is apparent that they could if they so desired.

Jackson E. Reynolds, counsel for the Reading, said in opening his argument, that the so called trust had not charged monopolistic prices. He declared that no product is marketed at so low a profit as anthracite coal and added that in the past 25 years the coal companies have not made more than 25c. a ton profit on their output. It had been testified by the independent operators themselves, he said, that the alleged trust sells the independents coal at a fair price. The coal companies, he asserted, sell to anyone, anywhere, at the same price.

Charges of exorbitant freight rates by the railroads had been made but these had been so completely refuted that he considered the issue dead. Statistics presented by Mr. Reynolds tending to show the amount of anthracite coal still unmined were greatly at variance with those offered by the Government. He declared that his figures were obtained from the assessors in the anthracite region while those of the Government were taken from a report made by a geologist to a New York financial institution 20 years ago. Mr. Reynolds' figures showed that the amount of unmined coal at the present time to be nearly 1,250,000,000 tons, while, he said, according to the Government, it amounted to less than 700,000,000 tons.

Continuing his argument on June 4, from the day before, Mr. Reynolds denied that the coal-carrying roads were operated in restraint of trade and interstate commerce. Pointing out the circumstances under which the defendants leased their coal lands to independent concerns, Mr. Reynolds endeavored to show that the Reading had done everything in its power to encourage competition in the anthracite mining district of the state.

John G. Johnson, senior counsel for the defendant railroads, took up the principal allegations of the Government. In giving his views of the suit, Mr. Johnson said:

It must be borne in mind that the Philadelphia & Reading Ry. is not the only railway serving the Schuylkill region. The Pennsylvania R.R. ramifies the Schuylkill field, and it is in evidence that in the year ending June 30, 1911, it transported from that region over 4,000,000 tons of coal and in the following year about the same amount. During the corresponding years the Lehigh Valley R.R. transported 2,800,000 tons and 2,230,000 tons, respectively. In this connection it will be recalled that the evidence shows that the Pennsylvania reaches every point of any traffic importance served by the Philadelphia & Reading R.R., both in Pennsylvania and New Jersey, and reaches New York Harbor and Philadelphia in the immediate vicinity of the terminals of the Reading system.

During the course of his argument, Mr. Johnson told the court that it was the very tribunal that authorized the Reading holding company to acquire control of the stock of the Philadelphia & Reading Coal & Iron Co. and the Philadelphia & Reading Railway Co.

It was also asserted that it was impossible to gain a monopoly over the production, transportation and sale of anthracite coal in the Schuylkill region as there were already 32 independent operators in that territory.

PENNSYLVANIA

Anthractite

Mahanoy City—While timbering in a tunnel of the Ridge colliery on June 4, one miner was killed and another fatally burned by an explosion of gas. The men fired the gas with their naked lamps. The fire was quickly extinguished.

Georgetown—Fire of an unknown origin broke out in the blacksmith shop at the Red Ash colliery, on June 3, and for the lack of efficient fire-fighting apparatus several buildings were destroyed, and much damage resulted. The building was burned with a large amount of tools. The timekeeper's office

was also burned and valuable books and papers were destroyed. The car shops, located in a frame building near-by, ignited and were badly damaged.

Pringle—Settling of the ground has been noticed near Washington St., the result of weak support of the roof in the mines of the Kingston Coal Co. As yet no serious damage has been done to adjacent property.

Shamokin—The Hickory Ridge Colliery of the Susquehanna Coal Co. suspended operations, June 4, when all union employees went on a strike to force a number of men to become members of the United Mine Workers of America. Between 600 and 800 men and boys quit work. About 500 employees of the Scott shaft, operated by the same company, also went on strike.

Wilkes-Barre—Litigation which has been long pending and which involved the royalties on a considerable area of coal land was brought to a close, June 4, when the Lehigh Valley Coal Co., filed an agreement with the recorder of deeds to pay \$155,000. The trustees of the proprietors of Kingston Township are the plaintiffs and the money derived from the settlement will apply to the school districts of numerous towns that have been formed from the original area of the township.

Bituminous

Connellsville—The Connellsville coke trade is steadily dwindling. Of the 37,935 ovens in the upper and lower Connellsville region, 21,020 are in operation, but their output represents only slightly over 80 per cent. of their capacity. A majority of the merchant ovens in operation are running six days per week, but the greater portion of the furnace ovens, on the other hand, are operating but four days.

Butler—As the result of legal proceedings to determine the ownership of the property of the Erie Coal & Coke Co., at Ferris, Fred Roe, a stockholder and five mine guards were recently arrested charged with trespassing. The Roe faction refused to give possession to Levi Deal, who was recently elected president and general manager. Deal's election is held to be legal.

Mount Pleasant—A class in mining has been started in the public schools by a number of young men of this district, and meetings will be held each Tuesday and Friday evening at 7 o'clock. James Wardlow, of Scottdale, has been engaged as an instructor. It is the intention of the students to continue the class as long as there is any information to be gained which will be of benefit to those attending. It is also intended to have instruction in first-aid work once a month.

WEST VIRGINIA

Charleston—Charles W. Mills, A. L. Faulkner and Patrick Gilday, commissioners of conciliation in the Kanawha Coal miners' strike in West Virginia, on June 8 held a conference with Secretary D. T. Evans and others of the operators' association, and Thomas Haggerty and Thomas Cairns, officers of the United Mine Workers, hoping to find a common basis of agreement.

Bluefield—In the first-aid contest held in Bluefield, on May 13, George E. Wysor, C. C. Bailey and T. J. Burwell tied for first honors in the one-man event. This tie was settled in a second contest held on May 30, when George E. Wysor secured first place with a score of 96.4 per cent. It should be added that Mr. Wysor served 10 years in the hospital corps of the United States Army in the Philippines.

KENTUCKY

Winchester—The Fidelity & Columbia Trust Co., of Louisville, was on June 3 appointed as receiver of the Day Lumber & Coal Co. with full power and authority to operate and manage the business of the company whose plants are situated at Clay City, Jackson and Beattyville.

Hellier—The Alleghany Coal Co. will make an increase of from 50 to 75 cars per day in output, effective June 15. Some 200 extra men will also be given work.

Whitesburg—Another big coal-developing company, a subsidiary of the Elkhorn Mining Corporation, is being organized in Baltimore, according to information received here. It is said that the capital of the new organization will be several million dollars. Its organization follows closely on the heels of the recent visit to this section of a party of Eastern capitalists. The new corporation, it is declared, will acquire about 20,000 acres of the Elkhorn Mining Corporation's property in the Boone's fork and Beaver Creek sections and develop them.

Stemp—A 100-acre boundary has been purchased and will be developed by the Leatherwood Coal Co., recently organized. The company has a capital stock of \$40,000 and R. C. and M. Cornett are among the incorporators.

OHIO

Columbus—Coal operators and striking miners of Ohio failed to reach an agreement on June 5 on a wage scale, and the joint conference was adjourned. After the adjournment of the joint conference, the miners and operators went into separate executive sessions.

Columbus—The Essex Coal Co., of Columbus, Ohio, has about completed equipping its two new mines in the Pomeroy Bend field which will be ready for operation when the Ohio mining scale is signed. The spur from the mine of the Kanawha & Michigan R.R., which is about three miles in length, has been constructed. One of the mines will have a capacity of 1000 tons daily and the other 1500 tons. Both will have modern electrical equipment and be arranged to conform to the anti-screen law.

INDIANA

Brazil—The tract of land just west of Carbon, recently purchased by the firm of Brown & Owens, has been leased to a company of Brazil business men, who will shortly drill for coal. It is said in case the coal is found at a shallow depth, steam shovels will be employed, and the coal stripped. If it is lower, however, and of a sufficient thickness, a mine will possibly be sunk upon this land.

Sullivan—The Booster Club has raised a bonus of \$2500 to obtain the shops and general offices of the Consolidated Indiana Mining Co., which proposes to spend \$7000 in building a plant.

The Shirley Hill Coal Co. recently paid the administrator of the estate of Frank Miller, killed in the mine, \$9104.

The Jericho mine and coal washer has reopened, after a shutdown since Apr. 1. A string of 800 empty cars was on the sidings.

Clinton—Miami mine No. 8 has resumed, the damages to machinery following a fire having been repaired. It is the largest employer of labor in the Clinton field, and holds the record of the 20 mines for the largest hoist in one day.

ILLINOIS

Springfield—Thirty pupils of the Bunn School have received certificates as first-aid students, as the result of a course given in this subject by the principal of the school and Thomas English, of the Illinois Mine Rescue Station.

Herrin—The engine room and boiler house, together with the generators, and the wash house at Mine B of the Chicago & Carterville Coal Co. was destroyed by fire recently, entailing a loss of several thousand dollars, which was covered by insurance. It will take about two months to repair and put the mine in shape for operation.

Sparta—The Illinois Fuel Co. has just finished the installation of a new crusher at its mine at this place. This company will be the first in southern Illinois to install a crushing plant at its mine to crush mine-run coal for large steam contracts, in order that the screenings may take a lower rate of anywhere from 10 to 20c. per ton under what the mine-run would take, were the mine-run to be shipped in that form and crushed at destination. Several Illinois roads have a lower rate on screenings than on the other sizes, and this mining company has devised a scheme that looks quite attractive to several large consumers.

Benton—The Middle Fork Mining Co., which is sinking a mine two miles southeast of this place, has secured 1700 acres and will make it a 4000-ton per day mine. It will be operated entirely by electricity, and the work is in charge of J. M. Seymour, who has had charge of sinking every mine in the vicinity of Benton.

Belleville—The influence of a certain element of a mining-town population is much in evidence here at the present time. An attempt has been made by the better element of citizens to eliminate the sale of intoxicants and the drunken scenes that have attended the annual picnic of the public schools of this city. Belleville is one of the few mining towns in Illinois that has failed to show any progress in municipal affairs or in a general moral way in the past 25 or 30 years.

The engine room at the Muren mine, operated by the Southern Coal, Coke & Mining Co., of St. Louis, just east of here, on the L. & N., was destroyed by fire recently, with a loss of \$10,000.

ARKANSAS

Fort Smith—Fifty men were sworn in as deputy United States marshals at Fort Smith on June 3, and taken to Prairie Creek to guard the mine of the Mammoth Vein Coal Co., operated by the Bache-Denman Co. Despite the fact that the company secured a federal injunction against strikers, clashes have been frequent. The mine recently was put into operation again.

WYOMING

Sunrise—A crew wearing oxygen helmets recently prevented a disastrous fire in the big mine of the Colorado Fuel & Iron Co. at this place. The fire was discovered in the bottom level, and would doubtless have spread had not the use of helmets made it possible for the fire-fighters to work in the smoke and gases.

FOREIGN NEWS

Sabinas, Mexico—It is reported that the French ambassador at Washington has requested the State Department to investigate the confiscation by constitutionalists of coal mines at Sabinas, owned by French interests. Managers of the mines are prepared to forward estimates of their damage to the State Department.

St. Petersburg, Russia—The latest result of the new anti-Jewish law is the closing of 50 collieries in the province of Ekaterinoslav, which are owned or leased by Jews. This action was taken by order of the assistant-governor of the province, and rendered 6000 miners idle. The Jewish proprietors are forwarding a petition to the Minister of Trades.

PERSONALS

J. D. Parker, chief engineer of the American Coal Corporation, resigned from that company on June 1 to engage in other business in Birmingham, Ala.

B. P. Manley, late of Denver and Salt Lake City, has assumed the position of general manager of the American Fuel Co., of Utah, and subsidiary interests.

V. P. Leyson, a native of Wales, has been appointed chief engineer of the Montevallo Coal Co., with mines at Montevallo, Ala., and assumed his duties June 1.

John Wynn, manager of the Edgefield Coal Co., near Canton, Ohio, sailed from New York June 10 on the "Aquitania" for Liverpool. He expects to spend several weeks in the British Isles visiting relatives.

Tom Sneddon, superintendent of the Diamondville, Wyoming coal properties of the Anaconda Copper Mining Co., sailed for Scotland, June 10, on the "Aquitania," on one of his periodical visits. He will be away about three months.

M. H. McCorkle, secretary of the Sterling Coal & Coke Co., has resigned and has been succeeded by Yale H. Manus, formerly secretary of the Winona Coal & Coke Co. H. G. Oaks has been made store manager by the former company.

Mrs. John C. C. Mayo, widow of the democratic national committeeman from Kentucky, it is reported will be elected a member of the board of directors of the Consolidated Coal Co., of Baltimore, and other important corporations in which her husband was interested.

Graene Turnbull has resigned from the Consolidation Coal Co. to take a place as secretary and treasurer of the Empire Coal Co., of Montreal, Can. Mr. Turnbull, for a number of years, was confidential man of President Jere H. Wheelwright, of the Consolidation Coal Co.

W. A. Thomas, for several years past commercial engineer in charge of all sales of mining apparatus for the Westinghouse Electric & Mfg. Co., resigned his position with that company on June 1, and has taken up the practice of consulting engineering in Pittsburgh with offices in the Second National Bank Building. His training in practical mining, coupled with his work with the large electrical companies and extensive experience with mining firms, should peculiarly fit Mr. Thomas for the new work which he has chosen. He will specialize on mining.

CONSTRUCTION NEWS

Heller, Ky.—The Elkhorn Consolidated Coal & Coke Co. is planning the opening of two new mines and extensions and increases in its plant, employing several hundred additional men.

Greenville, Ky.—The W. G. Duncan Coal Co. has awarded contracts to the Roberts & Schaefer Co. for the building of

two Marcus patent coal tipplers for installation at Greenville and Luzerne, Ky.

Pottsville, Penn.—The East Bear Ridge Coal Co. has taken possession of the Girard tunnel at Mahanoy Plain, and is shortly to advertise for the erection of a breaker, plans of which are in course of preparation.

Kewanee, Ky.—The Kewanee Coal Co. will build 50 additional miners' houses and open two additional mines, with a large increase in coal shipments within the next 60 days. Vast improvements will be made in the plant.

Mossy Bottom, Ky.—The Keyser Coal Co. is preparing for an extensive coal-mining operation here and will build a short line branch railroad from the Chesapeake & Ohio to reach it. It will ship from 60 to 75 tons per day from the start, while rapid increases are to be made.

Penny, Ky.—The Elkhorn & Shelby Creek Coal Co., which has its principal office at Jenkins, Ky., is now constructing a tippler and will operate two mines near here, with an initial capacity of 600 tons daily. According to W. J. Christopher, the manager, it may build a small power plant.

Cabin Creek Junction, W. Va.—The steam power plant of the Virginian Power Co. was formally opened June 6, a number of invited guests being present. This plant, which cost \$1,250,000, is believed to be the largest that has been constructed as an auxiliary plant supplying current solely to coal operations.

Birmingham, Ala.—The Maryland Coal Co. will increase its output at its Sipsey mines in Walker County. Several additional drift openings will be made at once, the object being to get the output up to 2000 tons per day. Although this mine is only about one year old, approximately 900 tons per day is now being mined. The improvements will cost in the neighborhood of \$100,000. The initial steps were taken recently in the actual development of the Panama Coal Co. property six miles east of Sipsey. The engineering force of the Frisco has started the survey for a spur to the mine. This property will be developed at once at a cost of approximately \$1,000,000.

Chicago, Ill.—S. M. Felton, president of the Chicago Great Western Ry. Co., has awarded a contract to the Roberts & Schaefer Co., for the building of three 100-ton capacity, reinforced, concrete, counterbalanced-bucket (Holmen type) locomotive coaling plants for installation at St. Joseph, Mo., Carroll, Iowa, and Kenyon, Minn. Also a 50-ton capacity frame coaling station at Red Wing, Minn. In addition, as receiver for the Pere Marquette Ry. Co., he has awarded this firm contracts for the building of two 100-ton concrete stations from the same design for installation at Blenheim, Ont., and Port Huron, Mich. The plants are alike and equipped with 100-ton weighing features.

Riola, Ill.—The Allen & Garcia Co., engineers, McCormick Bldg., Chicago, Ill., have completed the design and specifications for the new tippler to be erected for the Bunsen Coal Co., near Riola, Ill., and is asking for bids. This tippler will be of the well known A. & G. patented design and will probably be one of the largest and strongest steel tipplers ever constructed in Illinois. One of the innovations in its construction will be the wide docking table 30 ft. long placed immediately ahead of the weigh pan to enable the dock boss to examine the coal for rock and refuse before it goes onto the screen. A counterbalanced gate is placed at the head of the screen so that a car of dirty coal instead of passing from the docking table over the screens and into the cars can be readily diverted by means of this gate into a railroad car on the 4th track where the coal can be cleaned without interrupting hoisting.

NEW INCORPORATIONS

Dennison, Ohio—The capital stock of the United Coal & Fire Clay Co. has been raised from \$10,000 to \$100,000.

South Bend, Ind.—The United Mining Co. has been incorporated here, with \$25,000 capital stock, to deal in oil, coal and gas lands. The directors are S. M. McDonald, W. R. Roberts and O. S. Womine.

Glen Roy, Ohio—The H. & W. Coal Co. has been organized for the purpose of mining, with a capitalization of \$5000. The incorporators are G. W. Welch, Irene Welch, C. M. Reese, Carrie Reese and William Ware.

Fort Smith, Ark.—The Edwards & Edwards Coal Co. has been organized with a capital stock of \$20,000. The officers are W. F. Edwards, president; Jesse Edwards, vice-president; Helena Edwards, secretary, and Katie E. Edwards, treasurer.

Cleveland, Ohio—The West Virginia and Ohio Coal & Coke Co., has been organized for the purpose of mining with a capitalization of \$15,000. The incorporators are G. L. Cassingham, J. W. Canavan, C. L. Ayers, Ralph Iago, and Almieda Cassingham.

Providence, Ky.—Notices of dissolution of the Luton Coal Co., a Kentucky corporation, have been published. The company recently disposed of its holdings and serves notice that its business will be wound up on June 15. S. K. Luton was president of the company.

Owensboro, Ky.—The Bon Harbor Coal Co. has been incorporated here with a capital of \$2000. The company will engage in a general coal business, the mines being situated west of Owensboro. Louis Hoback is president and principal stockholder and S. Weikel, secretary and treasurer.

INDUSTRIAL NEWS

Lookout, Ky.—The Big Branch Coal Co. plans the opening of new mines on an additional coal tract near Lookout, with increases in its old operation of from 75 to 100 cars per day. This to become effective July 1.

Venice, Ill.—The Chicago & Alton R.R. has purchased a large acreage between this place and Brooklyn, adjoining its present right-of-way and near the roundhouse, to be used for an extension of coal-storage tracks.

Knoxville, Tenn.—In a petition in voluntary bankruptcy by the Consolidated Coal & Coke Co., of Knoxville, the liabilities are scheduled at \$6,794.86, and the assets at \$6,269.46 of which sum \$5,369.46 are represented by accounts due.

Columbus, Ohio—According to the financial report of the Hocking Valley Ry. Co. for the month of April there was a falling off of 46 per cent. in the freight revenue of the road as compared with April of last year. This decrease is due mostly to the suspension of mining.

Washington, D. C.—The Supreme Court on June 8 upheld the constitutionality of the Virginia law requiring companies mining coal or manufacturing iron or steel to pay employees at least monthly in money, and making it unlawful to issue scrip unless redeemable in cash at its face value.

Kansas City, Mo.—Coal men of Kansas City have received notice from the Northwestern Mutual Life Insurance Co. that in future it will not accept for insurance common mine workers, mine bosses and others whose principal work is inside the mines. This class has heretofore been accepted at an extra premium.

Pittsburgh, Penn.—Messrs. George H. Deike and J. P. Ryan, late of the U. S. Bureau of Mines, have organized the Mine Safety Appliances Co., with offices and stock rooms in the Curry Building, 451 Fourth Ave., Pittsburgh. This firm will handle the Koehler safety mine lamp, and the Seibergman & Co., Proto rescue apparatus.

Wilkes-Barre, Penn.—All the larger producing anthracite coal companies report that the production of coal for May will be slightly larger than that for the corresponding month of 1913, when 5,995,742 tons were shipped to market. It is believed that the output for May, 1914, will be somewhat above six million tons.

Washington, D. C.—The New York Central and other railroads were on June 3 refused permission by the Interstate Commerce Commission to cancel the proportional rate of \$2.10 per net ton from the Ohio coalfields to the upper Mississippi River crossings applicable on bituminous coal destined to points west thereof. The roads were directed to maintain the above named rate in effect for a period of two years.

St. Louis, Mo.—Advice from Washington, D. C., is to the effect that Col. Joseph F. Wolfner and Alexander A. Bryden, of this city, representing the Southern Illinois Coal Operators' Association, are meeting with considerable success in an attempt to induce the Secretary of the Navy to try out Illinois coal. It is claimed that Illinois mine-run coal can be delivered at various points on the seaboard at a price equal to that of West Virginia coal and at Gulf points for a lower price.

Punxsutawney, Penn.—The majority of the mines in this section are working two and three days per week, and even with this curtailed output, sidings everywhere are being filled with coal cars. Railroad tonnage is cut almost in half, and as a result many brakemen and firemen have been laid off. A number of conductors were also started flagging, and many engineers were put to firing. In Du Bois, more than 400 employees of the B. R. & P. railway have been laid off.

Coal Trade Reviews

General Review

Anthracite storage bins glutted with steam sizes and the initial curtailment in operations inaugurated. Further shrinkage in bituminous demand and the trade continues under heavy stress. Improvement in Lake shipping creates a more hopeful undertone.

Curtailment of operations in the anthracite regions is finally at hand, a few isolated collieries having reduced operation to five days during the current week. The market is glutted with steam grades, while so much has been stocked that storage capacity is about exhausted. With the possible exception of the New England market, the trade is settling down into a pronounced lethargy with the individuals aggressively raking the market for orders and offering large concessions on most sizes. The general stoppage has been further accentuated by an exceptionally light movement up the Lakes, shipments for the season to the first of the current month amounting to only half those for the same period last year.

In bituminous there is a growing tendency on the part of the operators to relax from their determined stand for a higher price-level than last year. What contract business remains open will be closed on the same basis as expiring ones. The demand is even less and indications point to a still further shrinkage, while consumption remains at a very low level with no immediate indication of any improvement. But even under the heavy stress the large distributing centers continue remarkably free of demurrage coal. While a moderate improvement may be expected beginning after mid-summer, there is so much excess coal that it will take some time to wipe this out.

A heavier Lake movement supplemented by the long continued shut-down in Ohio has given the first impetus to Pittsburgh district operations which have increased sharply to fully 75% capacity. However, the local trade is spotty, current requirements being light with negotiations on new contracts conducted at unsatisfactory figures. Stocks are generally much reduced, although there is still sufficient to adversely affect the market. The labor conference in Ohio, about which the market there has been hinging for some time resulted in a complete deadlock temporarily, and there is little change in the situation. In the meantime buyers are holding off, only taking sufficient West Virginia coal to meet current requirements pending the return of the Ohio operators into the market.

The May dumpings at Hampton Roads showed a substantial increase, aggregating more than a million tons. The movement at the moment is fairly good, although rather slow to New England, and circular prices are maintained except on small lots, which are subject to some cutting. Lump coal in the Southern market is steady under the impetus of a light summer's stocking movement, and prices are generally firm with only occasional shading to move demurrage coal.

No significant activity is noted in the Middle Western situation. Some dealers find that buyers are showing more interest as stocks are exhausted, and it is reported that a number of railroads will be in the market shortly, but the trade generally is looking forward to a period of unusual quiet.

EASTERN MARKET

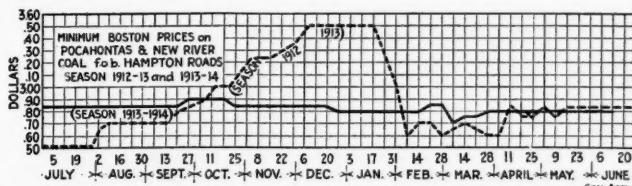
BOSTON

Pocahontas and New River prices still weak for inland delivery. No improvement in sight and even lower figures expected. Pennsylvania operators make prices to take tonnages previously held, but Georges Creek remains firm. Marine freights dull. Anthracite still in steady request.

Bituminous—There is substantially no change in the situation reported a week ago. Prices on cars at the various distributing points continue weak, and cargoes of Pocahontas and New River are still being forced on the market. On the few contracts that still remain to be closed there is a strong feeling on the part of shippers who had them last year to meet any price that may be made and the chances are therefore that some new low records may be established before June is over.

Some of the agencies who have cargoes waiting in what are regarded as restricted markets are deadlocked for orders and the trade is looking to see the coal finally moved at ruinous prices. Meanwhile, there is no pronounced offering of Hampton Roads coal at less than \$2.85, f.o.b., and while the volume of coal at the piers is not materially reduced yet the various interests seem reconciled to heavy tonnages on cars and manage to worry along with what orders happen to come.

In some industries here there are signs of picking up, but while the more hopeful believe the trend is that way there is nothing like a general improvement as yet. When it does come stocks are so large it will be some time before it creates any extra demand for coal. Certain of the Pennsylvania operators have been scalding down prices lately in the effort to hold business they had last year and several sales have been made at 15@20c. off what had been considered the season basis. Such tonnages, however, are only a normal movement and were taken to keep the mines running. Georges Creek is steady in price but with the output considerably curtailed.



Water Freights are very dull; 65@75c. are the prevailing rates from Hampton Roads to Boston, depending upon the size of the carrier. Several of the large sailing vessels are tied up on account of the slack business.

Anthracite—June is turning out a heavier month for deliveries than was expected. The companies are still well supplied with orders and new business is subject to a fortnight delay in most quarters. The Eastern dealers are taking on supplies up to the limit of storage, although the movement to the consumer is generally light. The cool weather is helping out somewhat.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambridges	Georges	Pocahontas
Mines*	\$0.90@1.50	\$1.20@1.65	\$1.67@1.77	New River
Philadelphia*	2.15@2.75	2.45@2.90	2.92@3.02	
New York*	2.45@3.05	2.75@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads†				\$2.80@2.85
Boston†				3.35@3.63
Providence†				3.40@3.68
* F.o.b.	†On cars.			

NEW YORK

Bituminous operations further curtailed. Less coal on demurrage but prompt demand entirely gone. Anthracite storage bins congested with steam grades and curtailed operations are going into effect.

Bituminous—The soft-coal market is characterized by a total absence of any new developments. Consumption continues at an abnormally low level, with the possible exception of in the textile lines, and production for the current week will run from 40 to 45% capacity as compared with 50% for last week. If anything, the demand is still less and shows every indication of further shrinkage.

Demurrage coal is rarely heard of only one important instance being noted recently, this involving 1000 tons of a good grade Pennsylvania product, which was offered at \$2, but later advanced to \$2.25. The comparative absence of consignment coal, in the face of the depressed conditions, indicates an excellent undertone in the market.

What few contracts are still hanging fire will be closed shortly, but the agencies are generally receding from their determined efforts in the early part of the season to obtain higher figures than last year, and the balance of this business will be closed on about the same basis. While there is an almost total absence of prompt demand, the nominal market is not notably changed and continues as follows: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.60@2.70; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—All of the prepared sizes of hard coal are now easy, with the possible exception of stove coal, while the steam grades are being put back into storage in such large quantities that bin capacity is being exhausted. Curtailed operations in the mining regions have already been put in effect at one or two collieries, and a general restriction is now definitely in sight. The market is glutted with the steam grades to such an extent that restricted operations are inevitable. The better grades of egg coal can be moved at the circular only when accompanied by a proportion of stove, and the off qualities are selling down to 10 to 20c. less than regular prices. Chestnut is the flattest of the domestic sizes, the off qualities being offered down to as much as 50c. off the circular and the better grades, 25c. less. Pea coal is about equally as bad, with plenty offered at concessions of 25 cents.

In the steam sizes, the low-grade buckwheats are selling down to \$2, while the better qualities are holding up to 15 and 20c. less than circular. There is an over-abundance of No. 2 buckwheat on demurrage which can be bought at \$1.60, f.o.b., while the better qualities are difficult to move at concessions of 10 and 15c. per ton. The collieries have been restricting the production of barley coal for the past two or three weeks, but there is such an excess supply, that the low grades are selling at \$1.25, and sales are even being negotiated at 5c. at the mines in order to permit a continuance of operations. The better grade of barley is selling at 15c. off the circular by the individuals, while the large companies are putting it into storage. The New York market on anthracite is now quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$4.80	\$4.55@4.70	\$4.75	\$4.50@4.65
Egg.....	5.05	4.80@4.95	5.00	4.75@4.90
Stove.....	5.05	4.95	5.00	4.90
Chestnut.....	5.30	5.00@5.20	5.25	4.70@5.15
Pea.....	3.55@3.60	3.30@3.60	3.45@3.50	3.10@3.45
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice.....	2.30	2.25@2.30	2.00@2.25	1.60@2.25
Barley.....	1.80	1.60@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Market for anthracite dwindling. Partial suspension of mining indicated. Orders comparatively few. No change in bituminous situation. Restricted operations fail to stiffen prices and market still continues heavy.

Anthracite—The past week has indicated that partial suspension of mining will be necessary to avoid flooding the market with surplus coal. While it is true that there is a demand for certain sizes, the mines cannot be worked full time to take care of these. It is understood that the storage facilities of some of the companies are well stocked with the small sizes, and as the demand for steam coals has been inactive for some time, the surplus has been going into stock. Of the domestic sizes, chestnut seems to be only one inclined to drag. Broken, egg and stove are all moving well, but the absence of storage facilities in the West, due to the large amount of coal carried over from last year, finds this outlet cut off.

This is doubtless the inception of short time work at the mines during the summer. Every effort is being made to instill some enthusiasm into the market, but the results are far from successful, and it does not seem possible to stimulate any business. Outside of the New England market, which continues about normal, there is really no activity whatever. Individual operators are offering large concessions from the so called circular prices, and making circumstances fit the case. It is understood as much as 35@40c. has been conceded on chestnut coal, in order to effect a quick disposition.

Bituminous—Continued curtailment of mining, coupled with low prices, still fails to create anything like activity in the bituminous situation. The industrial depression still has its effect in the call on contract coal, which in many cases have been reduced fifty per cent, and the demand for spot coal is comparatively nil. Of course, there is considerable tonnage moving, taken in the aggregate, but the comparison is so marked when lined up alongside of last year's business, that it makes a situation far from satisfactory.

BALTIMORE

General dullness characterizes both the bituminous and anthracite trade. A little better tone in New England and toward the West. Exporting continues the feature of the local market.

In a dull listless market, such as characterizes affairs here, there is little to be said. The hard-coal men say that they are doing some business, but orders for storage coal are only fair at best. Quite a few dealers will grant the full spring discount up to the last of June.

Bituminous conditions remain flat, although it is reported that more coal is being taken on contract for the New England market. Westward too, there is an awakening demand for West Virginia and western Pennsylvania fuels. This inquiry is at present the most encouraging feature of the trade. Meanwhile prices for spot coals remain about the same as last week. Slack is the weakest feature in West Virginia, selling at the mines at from 50 to 55c. Three-quarter gas is worth from 80 to 90c. Little or no change is reported in Pennsylvania line coals.

The export business remains a feature of the trade here and has aided incidentally in preventing any surplus at tide. Necessity for quick loading several times has wiped out some demurrage coal. A wide range is noted in the charter announcements of the past week.

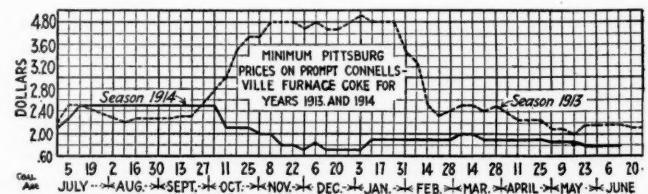
CENTRAL STATES

PITTSBURGH

Mining operations considerably increased in Pittsburgh district, mines operating at about 75% of capacity, chiefly on Lake business. Prices continue irregular, and slack sold at deep cuts. Coke stagnant, prices showing some undertone of strength and production and shipments decreased.

Bituminous—There has been a sharp increase in mining operations in the Pittsburgh district, and the district as a whole is operating at about 75% of capacity, the mines on some lines being in full operation. The increase is due almost wholly to shipments in the Lake trade, which are now fairly good. The Pittsburgh district, of course, is benefited by the partial or complete idleness, of other districts which cater to the Lake trade. There is hardly any domestic trade. The railroads are taking from 60 to 75% of their normal tonnages, and the chief reason that they are not taking full tonnages is that their freight business is light. They have consumed nearly all their stocks laid in some time ago. With manufacturing consumers the case is different, as their stocks are still largely in evidence, because they are operating at from one-half to two-thirds of normal, and stocks which were laid in for 60 days are strung out to 90 days.

An effort is being made to secure list prices on mine-run and screened coal, though with no great measure of success, and some contracts have lately been taken at rather deep cuts. In the case of slack there is no effort to secure the regular list figure of 90c., and prompt lots have sold down to 55c. in extreme instances. Operators are averse to making contracts for slack except for the full twelve-month, but on such contracts the price is sometimes shaded to 80c. We quote list prices, subject to more or less shading, unchanged as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; $\frac{3}{4}$ -in., \$1.40; $1\frac{1}{4}$ -in., \$1.50, per ton at mine, Pittsburgh district.



Connellsburg Coke—The market continues practically stagnant, but with a moderate undertone of strength, as some of the operators are strongly of the opinion that the second-half of the year will prove much better in the iron and steel industry than would be expected from present inactive conditions. One of the four large producers of foundry coke has reduced its price from \$2.65 to \$2.50, prices usually quoted being to consumers, which means 15c. less to dealers. The other operators are undecided whether to meet the reduced price. Contracting for foundry coke is slow. We quote: Prompt furnace, \$1.75@1.85; contract furnace, \$1.25@2; prompt foundry, \$2.35@2.65; contract foundry, \$2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsburg and lower Connellsburg region in the week ending May 30 at 244,028 tons, a decrease of 12,602 tons, and shipments at 252,437 tons, a decrease of 23,635 tons. Shipments exceeded production by 8409 tons.

BUFFALO

Indications of a possible stir in bituminous before long. Some consumers exhausting stocks. Strikes elsewhere also having their effect. No improvement in coke. Anthracite dull, but steady.

Bituminous—There is an occasional bituminous jobber who reports better business. Others report similar conditions when they say that the trade is spotty. One jobber says his May trade was 15 per cent. better than April and he is going to make June show an equal increase if he can. But it is a fact that some of the smaller consumers are running out of a supply. The railroads are asking for very little more than they did a month ago, but it is felt that they must reach the end of their supply before long. It all depends now on the consumption.

The strikes in Ohio and West Virginia are reducing the amount of coal coming on the market. It is also said that the agreements with the miners in the Pittsburgh district are not as secure and satisfactory as in the Allegheny Valley. All mines are still run on short time, as it is a certain loss to allow coal to leave the mine unsold. Salesmen are urging coal upon consumers at reduced prices. There is less complaint of coal on track at junction and terminal points, but there is still sufficient to do some harm. If there were none the seller would be able to get a profit, but such is hardly the case now. It is generally agreed that the price of bituminous is at the bottom, yet the more active dealers and shippers stand by the circular, which gives Pittsburgh lump at \$2.80, three-quarter at \$2.70, mine-run at \$2.55, and slack at \$2.15, with Allegheny Valley sizes about 25c. lower.

Coke—The market is without new feature of any sort, buyers ordering very sparingly. They are aware that the lowest level has been reached, but this is not a time for accumulation of stock of any sort unless it can be had at sacrifice prices. Coke furnaces are firm at \$4.50 for best 72-hr. Connellsville foundry.

Anthracite—The movement is light, but the general tone is good except that jobbers are already dreading the clamor that must come next fall on account of the failure of the consumers to stock up at the low prices. Most shippers by Lake are doing little, although one dock is alone active enough to run the week's total up to 124,000 tons, which is a fair summer average. Lake shipments for the season to June were 603,445 tons, according to custom-house figures, as against 1,143,860 tons to the same time last season. This difference bids fair to widen further as the surplus stocks at Upper-Lake docks is great enough to forbid anything like a heavy movement.

TORONTO

Yards well stocked and trade quiet, but prices steady.

Trade is quiet as compared with previous years at this season. Manufacturers in most lines are restricting their output, and not buying in excess of immediate requirements. The yards are well stocked and few consignments are now coming forward. Prices generally are steady at the following quotations, with occasional shading in steam coal by jobbers who are overstocked: Retail anthracite, egg, stove and nut, \$7.50; grate, \$7.25; pea, \$6.25; bituminous steam, \$5.25; screenings, \$4.35; domestic lump, \$6; cannel, \$7.50. Wholesale f.o.b. cars three-quarter lump, \$3.75; screenings, \$2.75.

TOLEDO

Buyers still holding off. West Virginia mines filling current requirements. Active Lake trade anticipated later in the season.

Pocahontas coal here is very scarce and is bringing prices considerably above the list when it can be secured at all. Domestic Southern coal seems to be in much better demand and there is an improvement in the call for steam fuels. Railroads are not as yet buying to any extent as they seem to be well stocked up. The Lake Shore is said to have purchased heavily of West Virginia coal so that it will be in no danger of a fuel shortage during the busy fall season.

Buyers are holding off and investing in but little of the West Virginia product as it is generally expected that the Ohio operators will be in the field again within a short time. Inquiries are beginning to come in from steam consumers rather freely, indicating that there will be buying from these quarters within a short time. The Lake shipping continues fairly active and there is no weakening of prices. Toledo dealers are hopeful and look forward to a good season's business later on.

COLUMBUS

Nothing accomplished at the labor conference which adjourned "sine die" but with arrangements for again convening later. Operators procrastinating until constitutionality of anti-screen law is finally determined.

With the labor conference a failure, the situation in Ohio shows little change. Mines are still idle and little will be done in negotiating a wage scale until after the constitutionality of the anti-screen law is finally passed on by the United States Supreme Court. The conference found both

sides strong in their demands. The miners' delegates stood strongly for a wage scale of 49.65c. for machine-mined coal on the mine-run basis, while operators as strongly opposed giving such a rate, saying that they would be unable to meet competition in other states if such a rate was paid. Governor Cox took a hand in the matter by asking the miners' officials to continue the scale committee and be ready to renew the meetings.

At the conferences, John M. Roan, of the mining department, represented the Governor. The adjournment was made "sine die," but both sides appear hopeful and there is a tendency among the rank and file of the miners to make a promise.

The demand for steam grades, which is becoming better now since surplus stocks are being exhausted, is being looked after by shipments of West Virginia and Kentucky coal. Mine-run, West Virginia coal is being sold between 70 and 85c. and other grades are correspondingly low. Domestic trade is also showing increased activity. Dealers in Ohio are selling quite a good tonnage, as many householders are inclined to stock up for the coming winter. Pocahontas and West Virginia splints are the popular grades for domestic demand. Little is doing in the Lake trade and comparatively few cargoes are leaving Ohio ports for the Northwest. The ore business continues bad, which has an influence on the coal trade.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump....	\$1.50@\$1.40	\$1.50@\$1.40	\$1.50@\$1.40	\$1.50@\$1.40
1-inch.....	1.35@ 1.30	\$1.20@\$1.15	1.35@ 1.30	1.30@ 1.25
Nut.....	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run.....	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack.	0.85@ 0.80		0.85@ 0.80	0.80@ 0.75
Coarse slack.....	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

CLEVELAND

Consumers beginning to show an interest in contracts for Ohio coals. Operations will be under way shortly. Price basis same as last year. Improving tone in the Lake trade.

Inquiry for Ohio coal is beginning to be general. No large contracts have been made, but the large consumers of No. 8 are showing more interest than at any time since the coal year opened. The inquiry is largely from lake customers who have only seven and one-half months in which to take in their coal. They at least want to know the price.

Locally the trade is buying from hand to mouth and enjoying prices which cannot last. There is a tendency to sell at very low prices merely because it seems better to move the coal than to store it. In the Youghiogheny field, stocking of slack is going on, but more than enough is coming in to meet the immediate needs of the local market. Withal there is an upward tendency on the part of the operators.

Youghiogheny slack has been selling at 50c. at the mines in competition with Fairmount gas. Toward the last of the week some operators would not meet the low price and from 5 to 10c. more was asked. The spot market was on the basis of \$1.60 to \$1.65 the last of the week. The low price of Pennsylvania coal has tended to drive Fairmount grades out of the field to a certain extent. Fairmount operators are holding to 50c. at the mines for slack which means \$1.65 here to the jobber and this is the high point of the market.

Ohio coal operators will do well to get the same prices as last year, when they start contracting. Pennsylvania has sold coal on contract at 5c. under 1913 prices and some of the larger shippers bought West Virginia fuels on about the same reduction.

The Lake Trade is not improving though a heavier movement is looked for this month. On June 1 two of the largest shippers to Lake Michigan were 50% behind last year on the same date. The Sault Ste. Marie Canals report soft-coal shipments for May to Lake Superior at approximately 475,000 tons less than in 1913 and anthracite shipments were about half. Anthracite movement will be heavier the rest of the season, and Ohio mines will undoubtedly begin shipping Lake coal by June 20.

Vessels of all sizes are plentiful. Boats are being held three to four days for coal. Toledo, Sandusky and Lorain docks, over which West Virginia coals are moved, had heavy line ups last Saturday, many of the boats not getting away for several days. Iron ore shipments are a little heavier than they were and the talk of tying up more boats is not so pronounced as it was.

For shipments the following prices, f.o.b. Cleveland, are being asked:

	Pocahontas	Youghiogheny	Fairmount
Lump.....	\$3.25		
Lump, 1½-in.....		\$2.35	
Lump, ¾-in.....		2.25	\$2.05
Mine run.....	2.60	2.20	1.95
Egg.....	3.25		
Nut.....		2.20	
Slack.....	2.25	1.55	1.65

CINCINNATI

A freer Lake movement is the only favorable change in the market. Business still slow generally with buying in all departments limited. Restricted production on account of labor troubles apparently having no effect.

In spite of the strike in West Virginia, the market has not improved to any appreciable extent during the past week. Reports indicating that there are more boats at the Lake ports ready for coal is the only news of a cheering nature received for some time; with prospects for a Lake movement of normal volume there will be one outlet for the superabundant supplies, at least. With a large proportion of the West Virginia mines closed down, it would seem questionable to refer to the supplies as abundant, but that is exactly the situation. Dealers are showing a marked reluctance to buy; the steam business is about as slow as it possibly could be, and there is no present indication of improvement.

Inability to dispose of screenings is one of the worst features of the market, and is seriously handicapping smokeless operators, who have their domestic grades sold up. This sluggish steam trade is undoubtedly due to the slow condition of business in general. While the domestic business may regain a normal volume within the month, and the Lake movement also reach its usual proportions, no real recovery of the trade can be expected until general situation improves.

DETROIT

Domestic business showing some increase, but railroad consumption at the lowest point in a long time. Ohio suspension has little effect on the market.

Bituminous—The general trade is still slow, no special inconvenience having been experienced as a result of the long suspension in the Ohio fields. Railroad requirements are down to the lowest point in years, and stocks laid in for 30 to 60 days are proving sufficient to last twice that long. Domestic business is showing some slight activity. Pocahontas egg and lump for June delivery is quoted at \$1.75, with July at \$2. The circular on splints is \$1.50 for June, and \$1.75 for July, on egg and lump. Adequate supplies of Hocking lump and three-quarter still seem to be available. The suspension seems to have little effect on the local market, and there is scarcely enough demand to absorb the current arrivals.

HAMPTON ROADS

Movement for the week fairly good. Demand still light with circular prices being maintained. Dumpings for month of May over one million tons.

Dumpings over the piers of the three railroads at Hampton Roads have been fairly heavy with a plentiful supply of coal left on the yards to take care of any vessels which may arrive during the next few days. Foreign shipments have been to St. Lucia, Coronel, Canal Zone, Naples, Ceara, Puerto Madryn, Venice, Port of Spain and Havana. There has been a fair supply of bunker steamers calling here during the week and while shipments to New England have not, perhaps, been as heavy as hoped for at the same time a number of large cargoes have moved to that market.

Circular prices appear to be maintained although there may have been some small parcels sold at a cut. So far as can be ascertained, however, no cutting is being done to any great extent.

During the month of May over one million tons of coal were dumped over the Hampton Roads piers. The Norfolk & Western Ry. is considerably in the lead with 528,270 tons; the Chesapeake & Ohio Ry. dumped 306,290 tons and the Virginian Ry. 263,151 tons. This is an increase of more than 35,000 tons over the figures for the month of May 1913. This increase is divided between the Chesapeake & Ohio and Norfolk & Western, the Virginian Ry. having fallen down to the extent of about 15,000 tons as compared with May last year.

The new steel pier of the C. & O. Ry. at Newport News having been completed and put into operation they are abandoning several of the old wooden piers which will later be taken down.

LOUISVILLE

A decidedly increased domestic demand. Steam grades weak but improvement anticipated shortly. Prices increasing at the usual summer schedule.

There has been a decided improvement in the domestic demand and mines are working on full time generally, with the output of most of them sold ahead up to the first of September. While this is making business good in that respect it is also causing a further glutting of the steam-coal market. Industrial requirements are small, numbers of the large users having reduced orders to half of the normal amount. Some relief is anticipated in the Middleboro section from the announcement of the Southern Railway that it will restore

the maximum tonnage at once. Since December this company has been operating on the minimum basis but is now planning to store the surplus for winter and spring use. The situation in the western Kentucky field is not as good as in the east. Many mines are working only one day a week while large numbers have closed down altogether until winter. The railroads which are the large consumers in the summer have been using only small amounts.

Prices on the domestic coals in both parts of the state saw a 10c. increase in June and there will be another in July and August, orders taken now for delivery in those months being at the advance price. Eastern Kentucky block coal ranges from \$1.40 to \$1.65, while August delivery prices range from \$1.60 to \$2. Nut and slack are at from 40 to 50c. for the poorer grades and from 65 to 75c. for the better qualities. All prices are f.o.b. mines.

SOUTHERN AND MIDDLE-WESTERN**BIRMINGHAM**

Market shows slight improvement over last week. Furnace and foundry coke quiet. Blacksmith coal falling off slightly in tonnage.

The lump-coal market shows some improvement over last week, as the retail yards are beginning to stock up for their fall and winter trade. Prices are remaining firm with no evidence that any reduction will be made from the regular circular. While steam coal is rather quiet, the fact that several of the large railroads have asked for bids on their annual tonnage has had a tendency to make the operators more confident, as the tonnage called for is quite large.

Spot shipments are weak, but prices are remaining about the same, with only an occasional reduction to move track coal. As is usually the case during the summer months, the tonnage on blacksmith coal is falling off slightly, but this cannot be considered as evidence that the market is weakening. Heavy sales of pig iron were made the past week at about \$10.50 per ton 2 Foundry, f.o.b. Birmingham. Furnace and foundry coke are still quiet, with no immediate improvement looked for.

INDIANAPOLIS

Conditions are back to normal for June. Mines are making better than half-time and prices are at the usual summer level. Industrial conditions steady.

Reserve stocks, accumulated in February and March, are exhausted and many buyers are again in the market. Contracts are being cleaned up, the larger operators reporting about 80% of them closed. Indiana mines are in operation about four days a week, which is up to the average for this season. Prices are also at about the same level as usually prevails this month, although slack is stronger than at this time a year ago; it is in good demand at 85 to 90c. Operators report industrial conditions in fairly satisfactory shape. The harvest in this state is less than a month away and the marketing of the big wheat crop is expected to mark the beginning of better times, whether the railroads get increased rates or not.

The retailers continue to put the Eastern coals into consumers' bins. There is enough uncertainty yet about mining conditions to induce those that have the money, to get their next winter's coal in hand. Indianapolis dealers are still selling at summer prices though not guaranteeing these later than July 1. The anthracite trade in this city is not lively because of a more general use of coke, which is the principal product of the local gas company. On account of the unsettled mining conditions in Ohio, no coal from that state is coming to this market. Pocahontas and other Virginia fuels find a good market here and dealers so far have been able to fill all orders.

CHICAGO

Little activity in Chicago market. Railroad contracts continue the principal feature in the trade. Not much demand for either steam or domestic coal. No change seen in the dull coke market.

There is nothing of material interest in the Chicago market. With practically no activity in any branch of the trade dealers are looking for a period of unusual quiet. If there is any relieving factor at all, it is a small number of contracts being closed by railroads and a number of large factories, who must use some coal. There is hardly any demand whatsoever for anthracite, while smokeless coal is about the same as for several weeks. Some dealers thought

the introduction of a lower grade of coal, with some of the attributes of smokeless, would effect the high-grade smokeless market, but no change in the latter is seen.

It is generally believed that the money stringency has played a large part in making the present dull situation. There are some, however, who believe that this will soon be relieved and better conditions prevail. The coke market is about on a par with general conditions and there is little, if any, demand.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	\$2.05@2.10	\$2.30@2.40	\$2.10	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		\$3.65
Mine-run.....	1.87	2.15@2.25	1.87	3.05@3.30
Screenings.....	1.77	1.96	1.67	

Coke—Connellsville and Wise County, \$5@5.25; byproduct egg, stove and nut, \$4.45; gas house, \$4.25.

ST. LOUIS

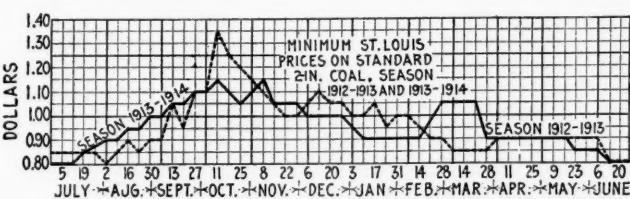
Situation generally discouraging but consumers showing a tendency to buy. Car shortage next fall being already anticipated. Surpluses seem well depleted.

There is a little contracting going on, either for steam or domestic, but the consumer is inclined to buy on the open market. Shippers feel that there will be a shortage of cars next fall which is making some of them a trifle cautious. The same unsatisfactory conditions as for several weeks past still continue in the different mining districts in Illinois and the mines in Williamson and Franklin Counties are gradually resuming operations, with practically no market for their output. The large supplies accumulated by the railroads previous to April are about exhausted now and most of the roads are again in the market. This is relieving the condition in the 5th and 9th Districts to considerable extent. Anthracite is moving in slow, and smokeless is picking up a trifle. Inquiries are coming in this month for domestic coke, but on the whole there is very little coal moving.

The market is now quotable as follows:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump.....			\$1.20	\$0.80 @ 0.90	\$1.15
3-in. lump.....			1.15		
6-in. lump.....	\$1.20 @ 1.35		1.25	1.00 @ 1.15	1.35
Lump and egg.....	1.85 @ 2.15	\$2.00			1.15
No. 1 nut.....	1.20 @ 1.35				
Screenings.....	0.85 @ 0.95		0.80 @ 0.85	0.70 @ 0.80	0.75 @ 0.80
Mine-run.....	1.00 @ 1.15			0.75 @ 0.80	
No. 1 washed nut.....	1.40 @ 1.50	2.25	1.50		
No. 2 washed nut.....	1.25 @ 1.35		1.35		
No. 3 washed nut.....	1.25 @ 1.30				
No. 4 washed nut.....	1.25 @ 1.30				
No. 5 washed nut.....	0.80 @ 0.85				

Coke—Gashouse, \$4; byproduct, \$4.75, both f.o.b. St. Louis.



KANSAS CITY

Business showing improvement. Coal moving to wheat fields. Lump in better demand from harvesters. Market steady.

Coal is being shipped in quantities to the scene of the wheat harvest in Kansas, Oklahoma and Missouri and business is much improved as a result. Lump is in better demand, about one-third of the threshermen buying lump, and the remaining two-thirds using nut. Nut is to be utilized exclusively in the South, while Northern agriculturists are showing a preference for lump. The market is steady and stiff, with no concessions offered by operators.

PORLAND, ORE.

Effort being made here to introduce Chinese anthracite on Pacific Coast. Local demand dull and will probably continue so for some time. Some fear expressed that Colorado strike may spread to Utah and Wyoming this fall. Wellington coal enters market.

Shippers at Seattle have corresponded with coal dealers here relative to possibilities of introducing Chinese anthracite on this coast. It is said the coal could possibly be retailed here for not to exceed \$12 per ton. Several steamship companies are operating regular service between the Orient and this port and it is certain that more satisfactory freight rates could be maintained on this coal than from Australia. Although it has been reported here that the Panama

Canal would undoubtedly be opened to traffic in a few weeks, coal dealers here have received information from the anthracite people in Pennsylvania indicating that there is no probability of any coal ships passing through the Canal before the first of 1915. This would make it too late in the season to admit of any large shipments for the coming season.

It has been intimated that there is a possibility of the Colorado strike situation extending into Utah and Wyoming next fall. This in addition to a car shortage may prove a hardship on consumers as well as dealers the coming fall.

Wellington coal has again entered the Pacific Coast market, and while little has as yet found its way into Portland, it is being shipped to San Francisco in considerable quantities. The condition of the market here has not justified much importation.

PRODUCTION AND TRANSPORTATION STATISTICS

VIRGINIAN RAILWAY

Total shipments of coal over this road for April of the current year amounted to 342,843 tons as compared with 345,039 tons for the same month last year.

ANTHRACITE SHIPMENTS

Anthracite shipments for May and the first five months of the current year as compared with last year were as follows:

	May		5 Months	
	1914	1913	1914	1913
Phila. & Reading.....	1,202,679	1,123,869	5,086,832	5,703,277
Lehigh Valley.....	1,249,218	1,191,632	4,829,093	5,408,310
Cent. R.R. N.J.	782,889	745,347	3,549,573	3,724,219
Del. Lack. & West....	901,596	882,651	3,656,638	3,961,646
Del. & Hudson.....	663,648	591,499	2,754,627	2,936,187
Pennsylvania.....	579,869	574,468	2,746,436	2,656,765
Erie.....	702,892	671,972	3,251,852	3,417,900
Ont. & Western.....	198,762	214,304	940,552	1,073,503
Total.....	6,281,553	5,995,742	26,815,603	28,881,807

FOREIGN MARKETS

GREAT BRITAIN

May 29.—With the Whitsun holidays so near, business is quiet. Quotations are approximately as follows:

Best Welsh steam.....	\$4.68 @ 4.80	Best Monmouthshires.....	\$4.11
Best seconds.....	4.53	Seconds.....	3.87
Seconds.....	4.29	Best Cardiff smalls.....	2.67
Best dry coals.....	4.32	Seconds.....	2.46

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, \$6.24; good foundry, \$4.80 @ 5.52; furnace, \$4.08 @ 4.56.

COAL FREIGHT DECISIONS

I. C. C. Nos. 5007 and 5601 Sub. No. 1—J. E. Stone & Son vs. Southern Ry. Co. (No. 5001) and Griffin-Hallinan Fuel Co. vs. Southern Ry. Co. (No. 5601 Sub. No. 1).

Rate of \$2.05 per ton on coal from Newcomb, Tenn., to Greenville, S. C., found to have been unreasonable insofar as it exceeded a rate of \$1.95. Reparation awarded.

Suspension Docket No. 280—Coal rates from Indiana and Illinois mines to stations in Iowa.

Proposed increased rates on coal from grouped mines in southern Indiana and Illinois to points on the Mason City & Clear Lake and Inter-Urban railways in Iowa held to be justified and order suspending their operation canceled.

Suspension Docket No. 338—Coal rates to Dewey, Okla.

Proposed increased rates on slack and run-of-mine coal from West Mineral and Fleming, Kan., to Dewey and Bartlesville, Okla., not found to be justified and directed to be canceled.

Suspension Docket No. 281—Proportional rates on coal from Ohio coal fields to Mississippi River crossings.

The cancellation of the proportional rate of \$2.10 per ton from Ohio coal fields to the upper Mississippi River crossings, applicable on bituminous coal destined to points west thereof, not justified.

Financial Department

Delaware, Lackawanna & Western

President Truesdale, of this company, reports, in part, for the year ended Dec. 31, 1913, as follows:

Results—The earnings, both gross and net, for 1913 were large, and reflected the business conditions of the country generally during that period.

The unusually large crops of all kinds produced in 1912 stimulated business activities in every direction, and as a consequence the railroads of the country during the greater part of the year handled an exceptionally large tonnage, in which this company participated to an extent not equaled in any preceding year. Our mining operations, which were suspended for about two months in 1912, were prosecuted without important interruption throughout the year and the transportation earnings on coal were, in consequence, \$1,138,203 more than in 1912.

Taxes—The increase in taxes was \$208,020, or 11.74%. This illustrates the current trend of affairs, national, state and municipal.

Coal-Mining Department—Our mining operations resulted in a larger production of coal than in any previous year. The net earnings from this source, however, were \$841,876 less than in 1912. This was due to various causes, but chiefly to higher mining cost. As explained last year, many of our mines have reached a point where the larger part of the coal produced is being mined from the thinnest workable veins of coal in the anthracite region, and in mining it large quantities of rock have to be taken out, which in some cases costs more to blast and remove than the coal itself. The miner has to use almost double the quantity of powder in taking out the rock that he uses to secure the coal, and his pay is increased accordingly. Much of the coal from these mines is also mined from the old abandoned workings and is secured only at a high cost per ton. The cost of mining has been further increased appreciably as a result of labor troubles.

The state of Pennsylvania has also undertaken to collect a tonnage tax on the anthracite coal produced on the basis of 2½% on the amount realized by sale of coal at the mines. This tax cost us about \$250,000. The increase in taxes levied by the counties and municipalities in the anthracite region cost us the additional sum of \$106,804.

The tonnage produced from our collieries and washeries was 8,844,063 gross tons, or 677,273 tons more than in 1912. The development of the new operations, i.e., the Loomis and the Laurel Run, has been pushed vigorously and should by Dec. 31, 1914, be producing a considerable tonnage.

Extraordinary expenses, aggregating \$959,511, were made for improved equipment and on the new developments. The outlook for the coming year, as respects the anthracite-coal industry, seems fairly encouraging.

Financial—During the year an increase of \$12,000,000 in capital stock was subscribed for by the stockholders; 50% of the subscriptions was called early in the year and the proceeds largely utilized in paying for the work done during the year on the new Clarks Summit-Hallstead line. The balance due on the new stock was payable Jan. 5, 1914. At the present writing these payments have all been made and certificates of stock issued therefor, thus making the present issue of stock outstanding \$42,277,000.

General Remarks—During the last two months of 1913 the business activity of the country at large slowed down very rapidly, and at present writing the volume of business being done is from a fourth to a third less all around than at the same time a year ago. This was in part due, no doubt, to the shortage of the corn crop of 1913, but to a greater extent, however, to a widespread feeling of doubt and uncertainty as to the effects of the tariff and currency legislation pending and under consideration by Congress and finally enacted into laws. The railways immediately felt this slowing-down process and have been forced to retrench.

The present outlook for 1914 appears to be somewhat uncertain, not to say discouraging, to the railway interests and those more or less dependent on them for their prosperity. Of course, if later in the year the prospects for abundant crops appear to be good, conditions may change very much from what the present outlook promises.

	Gross Revenues			
	1913	1912	1911	1910
Coal	\$14,418,507	\$13,280,304	\$14,096,725	\$14,067,778
Mdse., fight	15,089,067	13,999,359	12,462,679	12,443,473
Passenger	8,549,346	7,722,953	7,696,800	7,290,943
Mail, exp., etc.	2,727,235	2,561,894	2,330,359	2,250,738
Total rev.	40,784,148	37,564,511	36,586,563	36,052,932

	Operating Expenses			
	1913	1912	1911	1910
Mt. w. and st.	5,148,035	4,646,175	4,144,940	3,804,932
Mt. equip.	6,189,093	6,128,762	5,762,903	5,034,605
Traffic exp.	887,576	822,835	779,489	716,347
Transp. exp.	12,533,966	11,778,982	10,864,107	10,379,455
Gen'l exp.	815,173	769,668	767,213	688,110
Total exp.	25,573,842	24,146,423	22,318,652	20,623,448

The principal traffic statistics compare as follows:

	Coal Traffic			
	1913	1912	1911	1910
Tons (gross)				
transport	9,087,660	8,483,899	8,864,419	8,921,033
Tons 1 mile	*1,738,170	*1,491,246	*1,687,831	*1,681,100
Rate per ton-mile	0.830c.	0.835c.	0.835c.	0.837c.
Merchandise traffic:				
Tons net tr.	14,544,493	13,394,359	11,804,105	11,758,953
Tons 1 mile	*2,321,374	*2,139,002	*1,842,778	*1,788,021
Rate per ton per mile	0.650c.	0.654c.	0.676c.	0.696c.
All freight traffic:				
Earn per fgt. train mile	\$4.56	\$4.19	\$4.15	\$4.09
Av. trainload net tons	659.58	602.38	583.82	566.72
Passenger:				
Earn p. pass. serv. to mi.	\$1.71	\$1.63	\$1.61	\$1.55
Pass card	25,509,047	25,462,301	26,512,689	26,246,479
Pass. 1 mile	*546,309	*505,585	*510,845	*501,580
Rate per pass. per mile	1.565c.	1.528c.	1.507c.	1.454c.
*000 omitted.				

Note—For the previous annual report of this company, see "Coal Age," Vol. 3, p. 708.

32

Lehigh Coal & Navigation Co.

Railroads—The coal tonnage of the Lehigh & Susquehanna R.R. and branches aggregated 9,328,493 tons, an increase over 1912 of 338,790 tons, and a decrease from 1911 of 217,409 tons. The gross receipts were \$9,962,036, showing a net increase of \$41,550 over 1912. The Panther Creek R.R. has been merged with the Lehigh & Northeastern R.R.

The net revenue received from railroads for the year was \$2,495,081, a decrease of \$76,124.

Lehigh Navigation Electric Co.—The power plant of this subsidiary at Hauto has been practically completed, and is now in partial operation. Full operation will be inaugurated as soon as connections are made with prospective customers, with whom contracts have been made for the sale of a substantial amount of the power to be produced. It is hoped that negotiations will soon be completed which will provide a satisfactory market for the entire estimated production of the present installation.

During the year electric companies have been chartered to operate in additional townships which may be reached by the Lehigh Navigation Electric Co.'s transmission lines.

	RESULTS FOR CALENDAR YEAR 1913				
	Coal	Canals	Railroads	Miscellaneous	Total
	\$	\$	\$	\$	\$
Revenue	14,279,914	213,490	2,901,595	809,688	15,294,687
Expenses	9,808,108	253,135	406,514	20,823	10,488,581
Depreciation	*704,090	18,000	39,927	*762,017
Taxes	302,970	5,292	308,261
Net operating revenue	464,746	57,645	2,495,081	833,646	3,735,828
General administrative expenses					136,656
General taxes					232,459
Interest on funded debt					953,034
Other interest					41,168
Dividends paid (8%)					1,124,636
Balance, surplus					247,875
*Includes \$476,777 for depreciation and reserves and \$227,313 for depletion of coal lands. A includes \$534,705 for depreciation and reserves and \$227,313 for depletion of coal lands.					3,163,620